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THE LANCET

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No. XIX. OF VOL. I., 1940. LONDON, SATURDAY, MAY 11, 1940. Pp. 104—Price 1s.
No. 6089. VOL. CCXXXVIII. Founded 1823. PUBLISHED WEEKLY. Registered as a Newspaper. Annual Subscription: Inland £2 2s. Abroad £2 10s.

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No. 6089 LONDON: SATURDAY, MAY 11, 1940 CCXXXVIII

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At intervals during the last ten years we have carried out series of parallel investigations in which various media recommended for the diagnosis of diphtheria have been compared. We believe that, as a result of the introduction of various forms of blood-tellurite-agar in that period, the detection of *Corynebacterium diphtheriæ* has become a much more exact procedure than it ever was with the methods generally used ten years ago and still considered sufficient in many laboratories. It seems to us, therefore, that it may be of some value to those who are puzzled by the multiplicity of new media to publish some account of these investigations and to make some suggestions about everyday practice in the laboratory diagnosis of diphtheria. This may in particular be useful to some of those who have recently been placed in charge of newly established laboratories and have a limited experience of diphtheria work.

The investigations were carried out as five separate series of examinations. The first of these, which was largely the work of F. C. Happold, was the most extensive and covered all routine examinations done in the laboratory over one or two years. It was designed to make a rigid comparison between primary cultures on Löffler's medium and on the special tellurite, heated-blood, and agar medium introduced by Anderson et al. (1931), and it was supplemented by a similar and independent investigation carried out by K. E. Cooper at Bristol. The four others, which were carried out with K. E. Cooper, K. I. Johnstone, and K. Zinnemann, were much smaller and instituted comparisons between various blood-tellurite media recommended in this country and in Germany.

COMPARISON OF LÖFFLER AND HEATED-BLOOD-TELLURITE-AGAR MEDIA

The object of this investigation was to determine whether the use of Löffler's inspissated serum, so long supreme and unchallenged in the bacteriological diagnosis of diphtheria, could with advantage be supplemented or substituted by the use of low-temperature meat extract, heated-blood, agar, and tellurite medium introduced by Anderson et al. (1931) for the differentiation of the cultural types of *C. diphtheriæ* (*gravis* and others). The examination of swabs from 7429 cases submitted for report in the city of Leeds was included in this series. In each instance the swab received was inoculated first to a Löffler slope and then to a plate of the special tellurite medium. The results of this investigation can be summarised as follows: 1469 (19·8 per cent.) positives were recorded, including 255 cases in which there was a discrepancy between the results on the two media; in 59 (23·1 per cent.) of these the Löffler results were positive, whereas the second medium gave a negative or late positive result; and in 196 (76·9 per cent.) of them the tellurite medium gave a positive result, whereas that on Löffler was negative or doubtful.

This result corresponds fairly closely with that obtained by Clauberg (1931) in an earlier and similar series of comparisons between Löffler's medium and a fresh blood, tellurite, and agar medium which he introduced. In that series 20·3 per cent. of all positives were obtained only on Clauberg's medium, and 1·9 per cent. of all positives were missed on Clauberg's medium, whereas in our series 13·3 per cent. of all positives were obtained only on the medium of Anderson et al., and 4 per cent. of all positives were missed on this medium. So far, therefore, as the results are comparable, the superiority of the medium of Anderson et al. over that of Löffler is rather less than that of Clauberg's medium. The full superiority of results obtained on the tellurite medium in our series over those on Löffler was brought out better, however, when an analysis of the discrepancies between the findings on Löffler and those on tellurite medium was carried out. In all cases of discrepancy an inquiry form was sent to the doctor concerned and eventually in most cases to the fever hospital to discover the condition of the patient and so determine which medium was missing the more formidable cases. The results of this inquiry are presented in table I. It is noteworthy that among the cases which involved a considerable risk to the patients' lives—those above the transverse line in table I—there were 12 unsatisfactory results on Löffler's medium to 1 on the tellurite medium. Our attention, however, was drawn, during the period in which these results were recorded, to a fatal case in which the Klebs-Löffler bacillus was missed on tellurite medium.

TABLE I—ANALYSIS OF 255 DISCREPANCIES BETWEEN LÖFFLER AND TELLURITE MEDIA

Cases	On tellurite medium		On Löffler medium	
	Missed	Late positive	Missed	Doubtful
Fatal	0	0	6 (G)	2 (G)
Severe	0	1	2	0
Moderate	4 (2 G)	0	24 (20 G)	29 (24 G)
Mild	20	9	48	34
Carriers	3	2	12	4
Contacts	3	1	8	4
Not considered diphtheria	12	—	2	1
Rhinitis	1	0	8	4
No history obtained	2	0	4	6
Laryngeal	0	1	0	0

Figure in brackets with "G" indicates proportion of *gravis* cases.

Some time after the completion of the series just recorded one of us (K. E. C.) had the opportunity at Bristol of making a similar comparison between the

results obtained in parallel primary cultures on Löffler and on the Leeds medium. Bristol is an area where the *intermedius* type is predominant, and, since the results in Leeds could not be considered significant so far as this type was concerned, these observations supply valuable additional information. The series included 5659 cultures, of which 570 (10 per cent.) gave positive results on one or other medium. The incidence of types determined was *intermedius* 81 per cent., *mitis* 14 per cent., and *gravis* 2·6 per cent., 1·7 per cent. being atypical. There were 164 discrepancies; among these 34 were positive on Löffler and negative on tellurite and 22 doubtful on Löffler and negative on tellurite; 95 were positive on tellurite and negative on Löffler and 13 positive on tellurite and doubtful on Löffler. If the results doubtful on Löffler and positive on tellurite are ignored, there are left 557 possible positives, of which 17 per cent. were obtained only on tellurite and 6·1 per cent. only on Löffler. These figures are very similar to those in the Leeds series, the only differences being that the figures favour the tellurite medium a little more, probably owing to the difficulty experienced in differentiating on Löffler the very short forms of *intermedius* from the unusually granular Hofmann strain which is met occasionally.

COMPARISON OF VARIOUS TELLURITE-BLOOD-AGARS

Four further short series of investigations were made at intervals in the last three years. The swabs examined in these series were all taken from cases of diphtheria in the Leeds Fever Hospital. They were taken, however, either late in the disease or during convalescence. The object was to get material which would give a high percentage of positive results and would in many cases contain but few diphtheria bacilli, so that the relative values of different media might be efficiently tested. Since several media were tested simultaneously in each series, equality of inoculation was important. The technique adopted to secure this was to rub up the swab in 2–3 c.cm. of broth and then inoculate a drop of the resulting suspension to each medium. Except Löffler's, all the media contained approximately 1 part of potassium tellurite in 2000. They were the following:—

(1) The medium of Anderson et al. (1931) is referred to as the Leeds medium; it is a heated blood and agar medium of which the special feature is a basis of meat extract obtained at low temperature and sterilised by filtration.

(2) Glass's medium (Glass 1937), which contains fresh blood and is claimed for that reason to be superior to heated-blood media because of the inhibitory effect of the hæmatin, contained in the latter, on many *mitis* strains (Glass 1939).

(3) Neill's medium (Neill 1937), which has a basis of commercial meat extract and contains heated blood previously treated with ether and formaldehyde. It was included because its author claimed results with it much superior to those obtained with Löffler's medium, and it has the advantage of being simple to prepare.

(4) Clauberg's medium (Clauberg 1935, 1936); this has a great reputation in Germany and has recently been fully described by Sutherland and Iredale (1937). It is a translucent medium, containing unheated laked blood, of highly complex composition and preparation, on which, in virtue of its content of glucose and dyes, diphtheria bacilli develop bright-blue colonies. At its best it makes the diagnosis of diphtheria at sight a very simple matter, in so far at all events as the elimination of negatives is concerned.

(5) Gundel-Tietz medium (Gundel and Tietz 1934), which next to Clauberg's has had the greatest vogue in Germany. Since it is less well known to workers in this country and the descriptions of it are not so readily available as those of the others, the formula taken from Tietz (1935) is given below.

To 260 c.cm. of a 2½–3 per cent. solution of agar, buffered at pH 7·6, are added 1 c.cm. of stock cystine solution (the stock solution is prepared by dissolving 0·5 g. of cystine in 5 c.cm. of a 10 per cent. solution of Na_2CO_3 and this is diluted to 50 c.cm.) and a mixture of 30 c.cm. of defibrinated sheep's blood and 12 c.cm. of a boiled 1 per cent. solution of potassium tellurite puriss. (Grübler et Cie, Leipzig.) The mixture is poured as plates containing very thin layers.

Besides these, small series of investigations were made with the Leeds medium in which fresh blood was substituted for heated. Two or more observers took part in each series, and, to equalise the treatment of the various media, those used by observer A in the first series were given to observer B in the second series, and so on. Each observer formed and recorded his impressions independently of the others.

In the second series of investigations the media of Löffler, Neill, and Glass, and the Leeds medium were compared; there were 67 cases, of which 55 were found positive on one or other of the media. In the third series Neill's and Clauberg's media were compared with the Leeds medium on 100 swabs taken from 55 cases; among these, 45 positive results were obtained on one or other of these media. In the fourth series the Leeds medium was compared with the media of Neill, Clauberg, and Gundel and Tietz, and in part of the series also with that of Glass; 228 swabs were examined, and 82 of these gave positive results on one or other of these media; in the fifth series the media of Löffler, of Neill, and of Clauberg, and that used in Leeds were compared; 177 swabs were examined, and 37 positives were recorded on one medium or other. The order of value in which the various media were placed in the different series was as follows:—

Second series:—Neill, Glass, Leeds, Löffler.
Third series:—Leeds, Neill, Clauberg.
Fourth series:—Clauberg, Neill, Leeds, Gundel-Tietz, Glass.*
Fifth series:—Neill, Leeds, Clauberg, Löffler.

* The comparison with Glass's medium was only made in the first half of this series.

There is an element of irregularity in these results, the performance of each medium varying to some extent from series to series. This depends in all probability on variations in preparation, some of which are inevitable, as, for example, differences in samples of meat extract and others due to irregularities in heating, which could be eliminated but are very likely to occur. In one series these variations will have favoured one medium, in the next another.

A direct numerical comparison of the results obtained with each of these media with each of the others will not be attempted, because all did not appear in each series, and the numbers of examinations, therefore, available for analysis in which two media were compared directly would be rather small in some cases. A comparison, however, has been instituted on the two following lines.

(1) Since the Leeds medium has been used in each series, table II has been drawn up showing how each medium contrasted with it in the examinations common to both.

(2) Table III has been drawn up showing the positive results obtained with each medium as a percentage of the total positives obtained on all media with the same material.

The order is slightly different in the two tables, Glass's medium appearing equal to the Leeds medium

TABLE II—RESULTS ON VARIOUS MEDIA COMPARED WITH RESULTS ON LEEDS MEDIUM

Medium compared	Examinations common to both on positive cases	Positives on		Value of second medium stated as percentage of positive results obtained on Leeds medium
		Leeds medium	Second medium	
Neill	212	178	186	104·5
Clauberg ..	162	139	139	100
Glass ..	101	81	81	100
Gundel-Tietz	76	65	59	90·8
Löffler ..	79	65	51	78·5

in one and inferior to it in the other. In view of the relatively small series of observations they need not be taken as indicating more than that the first four media yield roughly similar results, and that Neill's would probably still come out on top in a larger series.

TABLE III—PERCENTAGE OF POSSIBLE POSITIVES OBTAINED ON EACH MEDIUM

Medium	Known positive swabs examined	Found positive	Percentage
Neill	212	186	87·7
Clauberg	162	139	85·8
Leeds	218	183	83·9
Glass	101	81	80·2
Gundel-Tietz ..	76	59	77·6
Löffler	79	51	64·5

FAILURES OF DIFFERENT MEDIA TOWARDS DIFFERENT BACTERIAL TYPES

Only two *intermedius* and two atypical strains came under observation in the last four series of investigations. The remainder were made up in the proportion of 55 per cent. of *mitis* and 45 per cent. of *gravis* strains over the whole group of observations, although a different proportion existed in some series, as shown in table IV, in which the failures as related

TABLE IV—DISTRIBUTION OF FAILURES OF DIFFERENT MEDIA AMONG DIFFERENT BACTERIAL TYPES OF DIPHTHERIA

Medium	Examinations of known positive material	Failures	
		With *gravis*	With *mitis*
Leeds	218	13	22
Neill	212 (55% *mitis*)	12	14
Clauberg ..	161	10	12
Glass	101 (50% „)	10	10
Gundel-Tietz ..	76 (39% „)	9	8

to the different types of strain are shown for the various media. It is clear from this that the differences are not great; but, so far as they go, they suggest that the Leeds medium and Neill's are rather better than the others for bringing out *gravis* strains, whereas the Leeds medium shows a definite inferiority to Neill's and Clauberg's towards the *mitis* strains.

STRONG AND WEAK POINTS OF THE VARIOUS MEDIA

Neill's medium.—The advantages of this medium are its good performance in promoting the growth of diphtheria bacilli, as shown by the figures given above, and its simple composition. The basis is Lemco's meat extract, which can be bought at any time but must be the extract prepared for use in bacteriological medium, which is vastly superior to the product prepared for domestic use. The blood used is sterilised by ether and formaldehyde and can be stored for long periods. It can, therefore, be obtained in the slaughter-house without special precautions for asepsis, and the need for keeping animals in the laboratory is eliminated. The colonies developed on this medium grow very large, and this facilitates their detection in somewhat the same way as the colour change does on Clauberg's medium. The weakest point of the medium is that the differentiation of types and, therefore, the elimination of diphtheroids is rather less easy than is desirable.

Clauberg's medium at its best is remarkably good and makes the selection of diphtheria colonies easier than does any other. It is probably the best of all media for picking out scanty colonies of diphtheria bacilli, especially *mitis*, among numerous diphtheroid colonies. Weak points of the medium are its delicate texture, which makes it liable to be easily wounded on inoculation if it is used in the thin layers recommended; its complicated composition, including dyes not now easily available; and the need of fresh sterile blood. It should not be assumed that this medium can be used for the diagnosis of diphtheria at sight, for a few diphtheroids develop blue colonies on it.

The *Leeds medium* gives the sharpest differentiation of types among these media and so makes the elimination of diphtheroids simpler than on most others. The most difficult differentiation is between a scanty growth of the *intermedius* type and that of some of the finely growing diphtheroids which appear in the nose. It is probably superior to other media in picking out small numbers of *gravis* colonies among numerous diphtheroid colonies in cultures from nasal carriers of diphtheria of this type. The chief drawbacks are the relatively troublesome procedure in preparation and the restricted growth of some *mitis* strains.

Glass's medium, although in view of Glass's experiments it should give better results than the heated-blood media in the isolation of *mitis* strains, has not come out particularly well in this investigation. The series of cases examined with it is rather limited, and it may not have been so successfully prepared as when used by its originator, but in this respect it has been on an equal footing with the media of Clauberg and of Neill. All were prepared by a competent laboratory steward following the instructions of the authors. Since in two series of investigations it proved inferior to Neill's medium both in the number of positives obtained and in the facility with which the colonies were detected in those cases in which a positive was recorded, it was not considered useful to carry on with it further. It has in common with several other media the disadvantage that fresh sterile blood is required.

The *Gundel-Tietz medium* appeared to us to be inferior to all the others, notwithstanding that it was examined by one of us who had extensive previous experience of its use when living abroad.

Löffler's medium.—The comparison of this medium with the various tellurite agars has been extensive in the whole series, and we do not consider it an extreme statement to say that those bacteriologists who continue to depend entirely on this medium are doing second-rate bacteriological work, so far as diphtheria is concerned. One of the weak points of

Löffler's medium is that it is often impossible to pick out small numbers of diphtheria bacilli among numerous diphtheroids, especially with *gravis* forms showing defective granular straining—a common event—or with *intermedius* strains which are very short and easily confused with granular forms of Hofmann's bacillus. There is also the occasional difficulty that when a sporing aerobe gains access to a Löffler tube it reduces the surface rapidly to a fluid medium in which conditions may not be favourable for the growth of *C. diphtheriæ*. On the other hand, Löffler's medium has one very strong feature—speed of growth of many diphtheria strains, which in characteristic morphological form may be detected six or more hours before colonies on tellurite media are so far developed as to be recognisable. We agree therefore with Shone et al. (1939) that it should be retained, and that there has been a tendency in some quarters to write it down unduly.

Other media.—A small series of observations on the Leeds medium with fresh blood substituted for heated-blood showed 6 per cent. more positive results with *mitis* strains than on the original medium, but colonies were less easily recognised.

CONCLUSIONS AND RECOMMENDATIONS

It seems to us, in view of the above findings and those of other workers, that the best results will be got in the practical diagnosis of diphtheria by duplicate examinations using Löffler's medium and one of the blood-tellurite-agar media. Where it is only possible to employ one medium, a blood-tellurite agar medium should be used, for it will give at least 10 per cent. more of positive results than the Löffler medium and is less likely to miss the most severe cases. Of these blood-tellurite-agar media the best available appears to be Neill's, unless special interest is being taken in the rapid differentiation of types, for which the Leeds medium is best suited.

If positive and suspect colonies are picked off from the blood-tellurite agar and subcultured to heated-blood agar (without tellurite), and if the appearances of the growth on both media and of the morphology in preparations taken from the second medium and stained with alkaline methylene-blue are considered, mistakes will be rare.

Where a strain shows the typical characteristics of the *gravis* or of the *intermedius* type, virulence tests are superfluous, and among strains showing the characteristics of the *mitis* type non-pathogenic forms are rare. It is therefore particularly among atypical strains—e.g., such as develop a *gravis*-like colony and pellicle in broth but do not ferment starch—that virulence tests become important, especially in examining suspect carriers.

As regards virulence tests, the injection of $\frac{1}{4}$–$\frac{1}{8}$ of an 18-hour Löffler slope culture into the axilla of a guineapig seems to us to be a more reliable one and in the long run little more expensive than the more modern procedure of simultaneous intracutaneous injections of several strains. A control animal injected with antiserum is unnecessary, provided that the animal dies with a local lesion, with pleural effusion and œdema combined with patchy congestion and collapse of the lungs and congestion or congestion and hæmorrhage of the suprarenals, and that these changes are associated with the recovery of diphtheria bacilli from the local lesion and rarely (Robinson and Marshall 1934) from the blood and viscera or with complete sterility of subcultures from lesion and blood. In routine practice it will probably be adequate to put through one in every ten strains to make sure that the sugar reactions and growths in broth correspond to the type as determined by appearance of colonies. For the experienced observer diagnosis at sight from heated-blood, agar, and tellurite plates can safely be practised at 18–24 hours where the appearances are characteristic, provided that colonies are picked off and examined in subculture on heated-blood agar, so that such corrections as are rarely needed may be made and sugar fermentations done with any doubtful growths.

Where both Löffler's medium and a tellurite medium are employed, all cultures positive on both or particularly characteristic on either may be reported without reservation. Where, however, only a few suspect forms or likely colonies are present in one, it is better to report "doubtful" and wait for the result of subculture before sending a final report.

It must be emphasised that much experience is needed before the full value can be got out of the blood-tellurite media, and it is therefore essential that anyone starting to use them should make a careful comparison of the results obtained with these media and with Löffler's medium and should proceed to the isolation and full identification of all strains obtained on tellurite media until he has acquired the necessary proficiency.

We have much pleasure in expressing thanks to Mrs. I. I. A. Zinnemann for valuable technical assistance; to Drs. J. S. Anderson and E. C. Benn, superintendents of the Leeds Fever Hospital, and to many practitioners in Leeds for supplying clinical information about cases; to Prof. H. D. Wright and Drs. V. Glass, G. A. W. Neill, and P. L. Sutherland for samples of media for comparison with those prepared in the Leeds laboratory; and to R. S. Burrow for much painstaking and efficient work in the preparation of media. We are indebted to the Medical Research Council for a grant in aid of expenses.

REFERENCES

Anderson, J. S., Happold, F. C., McLeod, J. W. and Thomson, J. G. (1931) *J. Path. Bact.* **34**, 667.
Clauberg, K. (1931) *Zbl. Bakt.* **120**, 324.
— (1935) *Ibid*, **134**, 271.
— (1936) *Ibid*, **135**, 529.
Glass, V. (1937) *J. Path. Bact.* **44**, 235.
— (1939) *Ibid*, **48**, 507.
Gundel, M. and Tietz, C. J. (1934) *Z. Hyg. InfektKr.* **116**, 439.
Neill, G. A. W. (1937) *J. Hyg. Camb.*, **37**, 552.
Robinson, D. T. and Marshall, F. N. (1934) *J. Path. Bact.* **38**, 73.
Shone, H. R., Tucker, J. R., Glass, V. and Wright, H. D. (1939) *Ibid*, **48**, 129.
Sutherland, P. L. and Iredale, J. L. G. (1937) *Ibid*, **45**, 325.
Tietz, C. J. (1935) *Dtsch. med. Wschr.* **61**, 834.

The Lancet 100 Years Ago

May 9, 1840, *p.* 236.

AT the Septenniary Festival of the LONDON HOSPITAL, in the Mile-end-road, held the other day at the London Tavern, the Duke of CAMBRIDGE in the chair, the subscriptions announced in the room, at the conclusion of the dinner, amounted, incredible as it may appear, to the noble and generous contribution of TEN THOUSAND AND NINE POUNDS, and, in addition to this enormous sum, as a general subscription to the hospital, it was announced that a sum of One Thousand Eight Hundred Pounds had just been subscribed, by gentlemen of the Jewish persuasion, towards the erection of an additional wing to the building, for the reception of destitute and afflicted Jews.

Facts of this description are calculated to raise the character of this nation above that of all others on the face of the globe. Where, beyond our own shores, could be found a company—simply, almost, a private meeting—at which a sum of ELEVEN THOUSAND EIGHT HUNDRED POUNDS would be subscribed in charity over the dinner table? Who shall say that England is poor, when such tales as these can be truly related?

DEATH IN THE FIRST MONTH AND THE FIRST YEAR

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II—Feeding in the First Month

THROUGHOUT our country, medical and nursing control of dietetics in the first month of life is poorly managed. This mismanagement of early feeding does not of itself cause death, but it disturbs and lowers nutrition and so opens wide the gate to infection. Under our prevailing conditions of a weakened defence, a cold wet climate, indifferent housing, and a low standard of cleanness in the home the baby is an easy prey to infection.

The fact of our high infant death-rates cannot be questioned. It is also a matter of fact, not of opinion, that these high figures are largely due to a continued steady loss of lives after the first month. The explanation is offered that this is largely due to mismanagement of early feeding. If this explanation is true it points the way to a remedy. We cannot hope to change our climate, and it will not be easy to rebuild our houses; but we can do much to improve our domestic habits, and above all else we have nurses and doctors who, at present untrained and incompetent in this early problem of dietetics, can be taught to master it and to establish good digestion and nutrition in the first month and so provide the strongest safeguard against infection.

BREAST-FEEDING

The nutrition of the unborn baby is by direct transference of assimilable food material from the maternal to the fœtal circulation in the placenta. After birth nutrition is indirect, by conveyance of the food (milk) to the alimentary tract of the baby, its digestion, and its absorption and assimilation—a much more complicated process and one that is new and untried. The first few days after birth are a quiet rehearsal of the new process; but the new machine is running at speed at the end of the first week. At this stage many difficulties crop up; and, unless these are understood and properly treated, the machine of digestion runs badly, and the whole complicated process of digestion, absorption, and nutrition gets out of gear. This period of inauguration in feeding and digestion in the first month is of critical importance for the subsequent health and safety of the baby. The food of choice is breast-milk, and its use is called breast-feeding. There is agreement all over the world among those experienced in infant feeding that successful breast-feeding gives the best results in nutrition and provides the strongest guard against every kind of infection; and the keenest advocates of breast-feeding are to be found in those countries and great towns where infant death-rates have been reduced to record low levels and where special measures have been taken to preach and teach the merits of breast-feeding and to secure its practice.

Defect in teaching of breast-feeding.—Here in Britain medical students are taught the great advantages of breast-feeding and about the chemistry and caloric value of human milk; but I do not know any medical school where adequate clinical teaching is given about the critical start of breast-feeding, the difficulties that arise then, and how they may be overcome. As regards the nursing of the baby in the first month, the trained midwife does receive in her maternity hospital school practical teaching about early breast-feeding; but in her practice she ceases attendance in the second week. At this time, when difficulties in breast-feeding are very common, the mother is not likely to receive expert advice in the matter from health visitors, district nurses, family doctors, or clinic doctors, for very few of these advisers have been clinically trained to recognise and treat these problems of early feeding. Our maternity hospitals handle well the problem of early feeding, but they lose control of it when mother and baby return home early in the second week.

Unnecessary weaning.—In early breast-feeding difficulties, unnecessary weaning is extremely common in the area of which I have clinical experience—Edinburgh and its adjoining country areas. I believe it is equally common all over Britain, and that it is the most important predisposing factor in the loss of infant lives after the first month of life. One example is given; but the records of children's hospitals could furnish hundreds of others.

CASE 3.—A boy, aged 19 days, was admitted to the Edinburgh Children's Hospital with the story of vomiting and serious loss of weight. He was weaned when 5 days old because of regurgitation of milk. But this became much worse in the next fortnight, when three kinds of cow's milk, fresh and tinned, were tried. On admission to hospital, the diagnosis of pyloric stenosis was made at once, but the weak and dehydrated condition of the baby caused operation to be postponed for 10 days. The Rammstedt operation was then done, and for a few days all went well, vomiting ceased, and weight was gained. He then developed bronchitis and bronchopneumonia and died.

This case illustrates one of the commonest causes of unnecessary weaning—vomiting. Vomiting never justifies weaning. The mistake almost certainly cost the baby its life. The advantage of continued breast-feeding in pyloric stenosis is recognised by all. If breast-feeding were kept up in all cases of pyloric stenosis, the recovery-rate in this disease would be very different.

Of the infants born in the Royal Maternity Hospital in 1938, 80 per cent. were wholly breast-fed and 12 per cent. partly breast-fed on leaving hospital. Spence (1938) gives Edinburgh figures collected by Dr. T. Y. Finlay, where in 3000 babies aged 3 months only 55 per cent. were breast-fed. If these figures are applicable to all Scotland, it means that breast-feeding, the ideal method of nutrition and the main bulwark against infection, is withdrawn in about 25,000 cases annually in these early months when the baby is specially vulnerable. This unnecessary weaning takes place to a great extent in the second half of the first month when mothers, delivered at home or in hospital, take up again the full load of household duties. At rest lactation may be sufficient, but under the sudden strain of work it falls off, although this is often temporary; and with or without the advice of a doctor or nurse the baby is weaned and given a bottle of cow's milk. In many cases of working-class mothers the question of the dieting of the infant at this critical stage, so momentous for its life and safety, is taken out of the hands of the doctor and left to the health visitor or the district nurse or often enough to some wise friend of the mother. The liaison between the maternity hospital or the home midwife and the health visitor is very imperfect; in any case the health visitor is seldom expert in difficulties of breast-feeding. It must be repeated that no blame attaches to the doctor or the nurse; the fault lies in their training. The training of the medical and nursing profession in the inauguration of milk feeding in the first month, and especially in the recognition and management of the difficulties that occur at this time, is quite inadequate. In theory the value of breast-feeding is one of the chief articles of the medical creed; in practice it is often abandoned on the most trivial difficulty.

Science and art of breast-feeding.—The management of breast-feeding requires a good deal more than knowledge of the chemistry of human milk. The milk has to be produced in the breast, to be conveyed to the baby's stomach, and to be digested. Breast-

feeding is thus the interplay of three processes—lactation, suckling, and digestion. Each of these processes has its data of structure and function, its anatomy, physiology, and pathology. The successful clinical handling of any medical problem is the application of the underlying anatomical, physiological, and pathological data. At present systematic lectures on breast-feeding in our medical school are largely devoted to the chemistry of milk and the theory of calories—the least important part of the subject. They are seldom followed up by clinical teaching and demonstration of babies suckling the breast and of early difficulties in lactation, suckling, and digestion. Is it surprising if the young practitioner is helpless when confronted with a difficulty and with a mother persuaded that she or her milk is at fault? This essential clinical teaching cannot be given in the wards of a children's hospital with their cases of dietetic disasters, but only in the nurseries of our teaching maternity hospitals.

Breast-feeding is not a simple but a complicated process, and it is one of the major problems of medicine and dietetics. Ignorance and mismanagement of it throughout the world cost the lives of many thousand babies. The problem will only be mastered, as other medical problems have been, by clearing its underlying foundations of anatomy, physiology, and pathology and by building clinical practice upon these sure foundations. It is worth repeating that infant dietetics is a new process which begins immediately after birth; and that in the first weeks this new and complicated machinery is being tried out. Disorders and disturbances in lactation, suckling, and digestion occur often and may be of many kinds. If they are located and understood, most of them can be overcome; but, if they are mishandled, the general condition of the baby can quickly deteriorate, and its life may easily be endangered by infection. A good deal has been said and written about the mental attitude of the mother and psychological difficulties in breast-feeding. If the physical difficulties are understood and dealt with, the psychical difficulties will quickly right themselves.

COW'S-MILK FEEDING

Under present conditions of medical and nursing practice many babies are weaned in the first month and bottle-fed with cow's milk, fresh, condensed, or dried. Another food, less digestible, is given at a time when the new process of digestion is not yet established and is often also disordered. It is a risky time to change the feeding, but the risk is taken. Sometimes the change is fortunate; much oftener it is not—and the digestion, already disordered, becomes worse than before. There is no difficulty in getting the new food, cow's milk; and there are dozens of different ways of giving it. Can it be said that medical science, which in Britain has made a poor job of the management of breast-feeding, shows more successful management of bottle-feeding with cow's milk? Our children's hospitals only get the failures, and these seem innumerable. But it is fair to say that many babies weaned in the first month because of difficulty with breast-feeding continue to give difficulty with bottle-feeding. Nature's handicap is bound to be heavier with cow's milk, which is not adapted to the baby's digestion and requires a good deal of modification. Again we know a great deal about the chemistry and the calories of cow's milk; but we do not yet know enough about digestion in the infant a few weeks old. Great trouble and ingenuity are shown in the manipulation of cow's milk; but little attention is paid to the baby's digestion, because little is known about its physiology or its pathology. The medical student sees in children's hospitals many cases of chronic dyspepsia in babies; but he sees very few at the early stage of the dyspepsia when the trouble has not become obstinate.

A baby, 8 weeks old, was admitted to the Edinburgh Children's Hospital with a history of vomiting from the first week of life. The vomiting was attributed to a fault in the mother's milk, and breast-feeding was stopped on the fourth day. Cow's-milk feeding was begun, and for the next six weeks six different kinds were tried. In all, seven turns of the dietetic wheel were made—breast-milk; dried cow's milk; fresh cow's-milk mixture; fresh cow's milk plus a little baked starch; condensed cow's milk; dried cow's milk; fresh cow's-milk mixture. Vomiting continued throughout. On admission the baby was much under weight. The vomiting was found to be functional but had now become a fixed habit.

The case illustrates mismanagement of early breast-feeding, then of bottle-feeding. A great dossier of similar cases could be collected from any children's hospital. And the primary fault does not lie in medical practice but in our medical teaching. Most of the dyspepsias of infants begin in the first month at the start of feeding and digestion. Our medical students seldom see these cases at this early stage and are taught very little about them.

Causes of death in bottle-fed babies.—I have said that bottle-fed babies are more liable to infections; most of these are gastro-intestinal and respiratory. Still's (1927) figures of 100 cases of fatal gastro-enteritis in babies—92 entirely bottle-fed, 4 mixed feeding (breast and bottle), and 4 breast-fed—are conclusive of the protective value of breast-milk against this infection. The rarity of rickets and scurvy in the breast-fed is accepted. I do not know of any figures in fatal bronchitis and bronchopneumonia; but the general hospital experience of fatal bronchopneumonia in babies under six months of age is that the great majority of these are bottle-fed. The much lower death-rate in breast-fed babies with pyloric stenosis is further good supporting evidence. The breast-fed and bottle-fed are exposed to the same unfriendly climate; they live in the same dirty and crowded homes; they both run the same risks of infection; but the breast-fed get off lightly, while the bottle-fed suffer heavy loss. Things might be better, if our general standard of management of bottle-fed babies were good; and many examples could be given of bottle-fed babies well-nourished and coming unscathed through heavy risks of infection. But, as things are, breast-feeding is the only strong shield of defence against infection; and how often and how carelessly is that shield thrown away!

In the sixties of last century the death-rate from infected wounds in our surgical hospitals was high; but there was no apparent remedy, and both surgeons and patients accepted it as an unavoidable risk. So by the blinding effect of custom and ignorance we now accept, not with complacency but with resignation, our heavy death-rate in the first year of life.

> "And custom lie upon us, with a weight
> Heavy as frost, and deep almost as life."

The death-rate in the first fortnight of life is heavy; it is due to special causes, which have been mentioned in the preceding paper; and its further reduction, although possible, presents a difficult problem. In Britain the death-rate in infants after the first fortnight of life continues steadily throughout the first year and at far too high a level. This continuing wastage begins really in the end of the first month and is due then to two principal causes: a gap in nursing supervision; and mismanagement of feeding, both of breast-feeding and bottle-feeding. These faults can be remedied. The remedies have been applied in some other countries, with results that have reduced there the loss of infant lives after the first fortnight to a mere trickle compared with ours. In the next paper I shall compare the infant death-rates in Britain with those other countries which are far ahead of us in their protection of infant life during the first year.

REFERENCES

Spence, J. C. (1938) *Brit. med. J.* **2**, 729.
Still, G. F. (1927) Common Disorders in Childhood, 5th ed., London, p. 281.

FOLLICULAR HYPERKERATOSIS: A SIGN OF MALNUTRITION?

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THE cutaneous eruption described below was observed in children during a survey of the nutrition of adolescents, school-children, and children of pre-school age in different parts of Great Britain. It is suggested that this is similar to those described by the older writers under the names of lichen pilaris, lichen spinulosus, nutmeg-grater skin, and scorbutic goose-flesh, and is an early stage of the condition described by Pillat (1929) and Frazier and Hu (1931) in China and by Loewenthal (1933) in Africa as follicular hyperkeratosis and by Nicholls (1933) in Ceylon as phrynoderma.

NAKED-EYE APPEARANCES

The eruption (fig. 1) consists of crops of enlarged hair follicles appearing first on the extensor aspects of the arms, legs, and buttocks, and later and less commonly over the scapulæ, back, and abdomen. It has not been observed on the hands, feet, face, or genitalia. The eruption is symmetrical, does not irritate, and often has not been noticed by the patient. The skin feels dry and rough and is sometimes furfuraceous. On closer inspection the hair follicles are seen to be enlarged to a diameter of 1–3 mm. They are firm and cone-shaped. The hair is absent from many of the follicles, and in its place there projects to a distance of about 1 mm. a tiny spine of horny material. It is these spines that impart to the hand the sensation of roughness or "nutmeg-grater skin." At the orifices of some of the follicles the hair can still be seen, often curled, shrivelled, or broken. Occasionally the follicle is pink and indurated, indicating a mild inflammation; pustulation of the follicles was not observed. Sometimes the enlarged follicle is surmounted by a flat imbricated scale instead of a horny spine. If a large follicle with a projecting horny spine is selected, the horny material may be squeezed out with forceps, leaving a minute crater. These craters are sometimes seen apart from interference. The sexes were equally affected, and the eruption was not observed in children under five.

The fully developed condition was present in about 5 per cent. of 3000 children. Simple enlargement of the hair follicles, resembling a permanent cutis anserina, on the extensor aspects of the arms and legs, without projection of horny spines from the orifices of the follicles, was found in about 20 per cent. of the children. In these cases the skin was not noticeably dry. The eruption tends to develop in several members of the same family. In a London family of eight children all except the baby had it. It is impossible to say at this stage whether simple enlargement of the hair follicles is an earlier stage of the eruption or a different condition.

ILLUSTRATIVE CASE-RECORD

A biopsy was performed on a boy aged 14, who showed moderate enlargement of the follicles with projecting horny spines, together with definite signs of malnutrition. He was anæmic, with hæmoglobin 72 per cent. (Haldane), and was 3½ in. below average height and 18 lb. below average weight for boys of his age (Kershaw 1938). An analysis of the diet consumed by his family is given in the accompanying table. The family consisted of the mother and father,

DAILY INTAKE OF THE FAMILY

Calories, 1602	Phosphorus, 0·60 g.
Protein, 44 g.	Total iron, 8·52 mg.
Carbohydrates, 284 g.	Vitamin A, 637 I.U.
Fat, 28 g.	Vitamin B_1, 211 I.U.
Calcium, 0·29 g.	Vitamin C, 8 mg.

a boy aged 14, and three girls, aged 12, 10, and 5. The table gives the average daily consumption per head and is derived from a detailed record of the diet for a week. It reveals a deficient intake of all constituents, except carbohydrate and, possibly, iron and vitamin B_1.

Histological examination.—An ellipse of skin, about 1 in. long and including the subcutaneous tissue, was excised from the extensor aspect of the arm, and serial sections were prepared, which revealed a general degree of hyperkeratosis (fig. 2). The epithelial surface was covered with a layer of squames about equal to the thickness of the epithelium. At the mouths of the skin glands this hyperkeratosis was much more pronounced, and the upper part of each hair follicle was distended with a conical plug of keratinised material. There was some epithelial hyperplasia near some of the hair follicles. Pigmentation of the surface epidermal cells was not pronounced. A striking abnormality was the complete absence of sebaceous glands in association with the hair follicles; not a single sebaceous gland was recognisable. A mononuclear cellular infiltration was seen in some cases in relation to the hair follicles where the sebaceous gland should have been and round some of the sweat-gland ducts. Within the hair follicles the hair shaft could often be seen to be poorly formed and sometimes cut in several planes, as if coiled up behind an

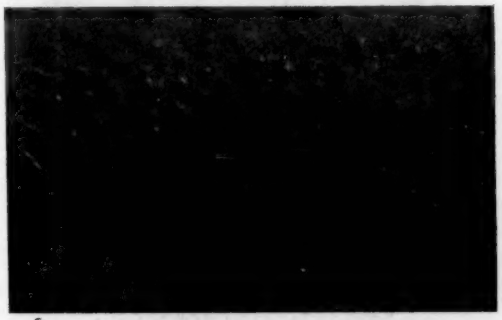

FIG. 1—Follicular hyperkeratosis on the extensor aspect of the arm of a girl aged 14. (Life size.)

obstruction at the mouth of the follicle. The sweat glands were rather atrophic, and the acini in the deep portion of the dermis seemed to be fewer than usual. The photomicrograph (fig. 2) illustrates these abnormalities of the hair follicles. In particular it shows the absence of the sebaceous glands, distension of the hair follicles, the blocking of their orifices with keratinous material and a mild lymphocytic inflammation near the base of the follicle.

DISCUSSION

Pillat (1929), working at Peiping, found that 209 out of 3000 soldiers had ocular manifestations of vitamin-A deficiency. Many had signs of systemic disease, including certain abnormalities of the skin which Pillat considered to be the result of vitamin-A deficiency. The cutaneous lesions of 15 of them, aged 17–31, with keratomalacia were studied by Frazier and Hu (1931). These lesions correspond closely, as regards naked-eye appearance, distribution, and histology, to the eruption described above, strongly suggesting that the two conditions are essentially the same. Frazier and Hu admitted their patients to hospital, and after two to three months on a well-balanced diet and 1 oz. of cod-liver oil daily the skin regained its normal texture. They believed that the eruption was due to vitamin-A deficiency, and that the pathological changes were essentially a keratinising metaplasia analogous to the process, described by Wolbach and Howe (1925), in the respiratory passages of rats on diets deficient in vitamin A, and, by Blackfan and Wolbach (1933), in infants dying of keratomalacia and pneumonia.

Loewenthal (1933), in East Africa, described a similar cutaneous eruption among 81 native prisoners on a deficient diet. The eruption was associated with night-blindness, xerophthalmia, and acne. Unlike

most other observers he found that itching was pronounced. He treated 2 of his patients with vitamin A (Avoleum); in one the eruption cleared up in eight weeks, and in the other it had almost done so in seven weeks, when the supply of avoleum was exhausted. His other cases cleared up in about nine weeks on 1 oz. of cod-liver oil daily. Loewenthal considers that dry skin is the earliest sign of vitamin-A deficiency, and that the follicular eruption varies with the age of the child, older children having small papules, whereas in the very young it may resemble goose-flesh. Nicholls (1933), in Ceylon, found a similar condition in an investigation of 1500 prisoners on deficient diets and named it phrynoderma. Phrynoderma was commonly associated with keratomalacia, mild neuritis, night-blindness, xerophthalmia, and a liability to

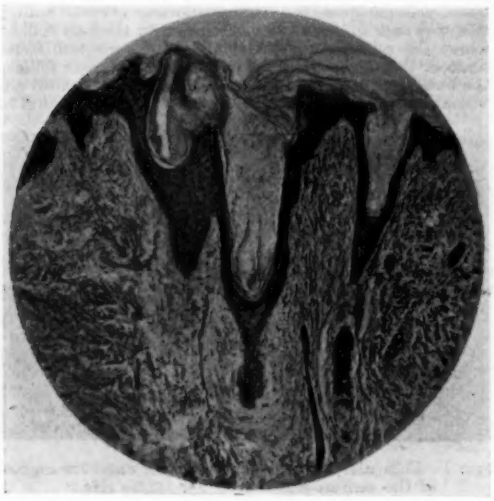

FIG. 2—Follicular hyperkeratosis showing (1) plugging of the hair-follicle with keratinised material; (2) absence of the sebaceous gland; (3) increased keratinisation of the superficial layers of the skin; and (4) infiltration of small round cells near the base of the follicle. (× 80.)

diarrhœa or dysentery. He considered that it was due to vitamin-A deficiency, but that other factors in the diet might be at fault.

Goodwin and Mackay (1934) reported a case arising in London in a boy aged 10. After six weeks in hospital on a good mixed diet with cod-liver oil, the skin was almost normal. Mackay concluded that it was due to vitamin-A deficiency and was "far from rare in this country." Rao (1937) described in similar terms to the above writers the condition as it is seen in India. It was again cured by the administration of cod-liver oil. The older writers appear to have described the same eruption under the name of lichen pilaris, lichen spinulosus, or keratosis. Crocker (1893) described it as "an inflammatory disease of the hair follicles in which a spiny epidermic peg occupies the centre of the papule" and in which there was "hyperplasia of the epidermic cells" lining the follicles.

ÆTIOLOGY

There is still some doubt about the exact ætiology of follicular hyperkeratosis or phrynoderma. It is generally believed to be nutritional in origin, although different observers do not agree about which specific food factor is involved. Frazier and Hu (1931) and Nicholls (1933) found that their cases cleared up after the patients had been admitted to hospital and given cod-liver oil. Loewenthal's cases cleared up on cod-liver-oil, except two which cleared up on vitamin-A concentrate alone. These workers consider that follicular hyperkeratosis is an early and specific sign of vitamin-A deficiency. On the other hand, Reiss (1936) found, in 7 cases in Chinese adolescents, that the association with night-blindness and keratomalacia was not close, and that in 3 of his cases the follicular hyperkeratosis did not respond to cod-liver oil. Wiltshire (1919) described the condition in 32 per cent. of 78 consecutive cases of scurvy in Serbian soldiers and considered that the eruption was an early sign of scurvy. Scheer and Keil (1934) also found a follicular eruption in 2 cases of adult scurvy and suggested that a deficiency of either vitamin-A or vitamin-C might be responsible. They consider that in vitamin-A deficiency the chief effect is on the epithelium of the epidermis and the hair follicles, whereas in vitamin-C deficiency there is a tendency to capillary ecchymoses round the bases of the follicles. Aykroyd (1938) found that in some cases the eruption tended to disappear with the addition to the diet of skimmed milk only. It seems that most of the evidence supports the theory that the eruption is an early sign of vitamin-A deficiency, as a rule preceding the onset of night-blindness and xerophthalmia.

CONCLUSIONS

On clinical and histological grounds the eruption observed by me is similar to that described by the workers whose reports I have cited. Clinically, the nature of the eruption, its distribution, and the absence of symptoms are common to most of the descriptions. Histologically, there are keratosis of the skin surrounding the hair follicles, leucocytic infiltration in relation to the follicles, absence of the sebaceous glands and atrophy of the sweat glands, together with the distension or plugging of the hair follicles with keratotic debris. The eruption is not uncommon among elementary-school children in this country. It is believed that it is an early sign of malnutrition.

SUMMARY

An eruption is described which was observed in about 5 per cent. of 3000 children and adolescents examined in various centres in Great Britain during a nutritional survey.

Histological examination showed hyperkeratosis of the hair follicles, absence of sebaceous glands, and round-celled infiltration round the follicles. It is thought that this eruption is similar to the follicular hyperkeratosis or phrynoderma described by various writers in Africa and the Far East, and that it is of nutritional origin.

The specific dietary deficiency to which follicular hyperkeratosis may be attributed has not been certainly established, but the condition is probably an early sign of a deficiency of vitamin A or of fat.

The observations recorded here were made in the course of the Carnegie United Kingdom Dietary and Nutritional Survey. I am indebted to the trustees and to Sir John Boyd Orr, director of the Rowett Research Institute, Aberdeen, for permission to publish. I wish to thank Prof. D. F. Cappell, of the department of pathology in the University of St. Andrews, for assistance in the interpretation of the histological changes and for the photomicrographs, and Mr. Corkhill for the preparation of the serial sections of skin.

REFERENCES

Aykroyd, W. R. and Krishnan, B. G. (1936) *Indian J. med. Res.* **24**, 411.
Blackfan, K. D. and Wolbach, S. B. (1933) *J. Pediat.* **3**, 679.
Crocker, R. (1893) Diseases of the Skin, London.
Frazier, C. N. and Hu, C. K. (1931) *Arch. intern. Med.* **48**, 507.
Goodwin, G. P. and Mackay, H. M. M. (1934) *Brit. med. J.* **2**, 113.
Kershaw, J. D. (1938) *Med. Offr.* **59**, 129.
Loewenthal, L. J. A. (1933) *Arch. Derm. Syph., N.Y.* **28**, 700.
Nicholls, L. (1933) *Indian med. Gaz.* **68**, 681.
Pillat, A. (1929) *Nat. med. J. China*, **15**, 585.
Rao, M. V. R. (1937) *Indian J. med. Res.* **24**, 3.
Reiss, F. (1936) *Chin. med. J.* **50**, 945.
Scheer, M. and Keil, H. (1934) *Arch. Derm. Syph., N.Y.* **30**, 177.
Wiltshire, H. (1919) *Lancet*, **2**, 564.
Wolbach, S. B. and Howe, P. R. (1925) *J. exp. Med.* **42** 753.

HYPERTENSIVE EFFECT OF BLOOD FROM HYPERTENSIVE DOGS

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Goldblatt (1934) has shown that partial occlusion of the renal arteries in dogs leads to relatively permanent hypertension. Page (1939) and Greenwood, Nassim, and Taylor (1939) have obtained the same result by encasing one or both kidneys. Using Trendelenburg's toad preparation Fasciolo and others (1938) have demonstrated a vasoconstrictor substance in blood plasma taken from the renal veins of animals treated by Goldblatt's technique. They did not, however, find such a substance in the systemic blood.

The Goldblatt type of renal hypertension is probably due to a generalised vasoconstriction. It is important, therefore, to determine whether or not a substance can be found in the systemic blood which might produce such vascular activity. To eliminate confusion due to a possible species difference in sensitivity to a vasconstrictor substance, the test animal should be of the same species as the hypertensive animal. Katz et al. (1939) have transferred small quantities of blood from an hypertensive to a normal dog without producing a rise in blood-pressure. In the experiments here described we have accomplished the exchange of large quantities of blood over short periods of time between hypertensive and normal or nephrectomised animals. The blood-pressure of nephrectomised recipient animals was invariably raised, that of normal animals being unchanged or lowered.

EXCHANGE TRANSFUSIONS BETWEEN DOGS

HYPERTENSIVE DOG			NEPHRECTOMISED DOG		
Weight (lb.)	Systolic blood-pressure before exchange (mm. Hg)	Maximal systolic blood-pressure during 1st 3 hrs. of exchange except 1st 5 min. (mm. Hg)	Weight (lb.)	Systolic blood-pressure before exchange (mm. Hg)	Maximal systolic blood-pressure during 1st 3 hrs. of exchange (mm. Hg)
20	260	140	14	130	180
35	185	180	19	120	170
20	200	180	10	110	160
30	160	150	20	120	140
22	190	130	20	110	130
35	190	185	10	130	165
34	190	170	24	140	160
HYPERTENSIVE DOG			**NORMAL DOG**		
23	220	95	45	140	110
32	215	215	19	140	90
25	210	200	15	140	138

Exchange-rate of approximately 3 litres of blood per hour in each direction used throughout.

METHODS

Hypertension was produced by placing a clamp on one renal artery (Goldblatt 1934) or encasing one kidney in a cast of collodion gauze (Greenwood et al. 1939). About three days later the other kidney was removed.

The clamp used in our experiments (fig. 1) is simpler to construct and to use than the conventional Goldblatt type. The applicator is made of brass, the clamp of bar silver. The compression plate of the clamp is riveted to the end of the compression screw and is free to turn on this screw; the riveted end of the screw is countersunk in the plate. The clamp is held

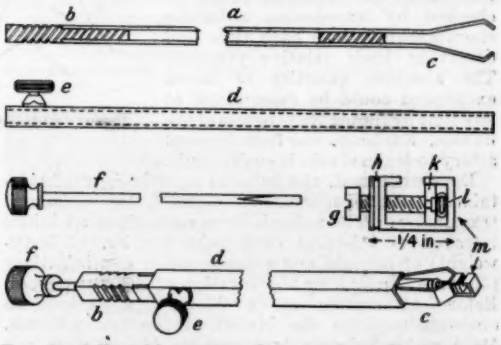

FIG. 1—Adjustable artery clamp and applicator: (*a*) clamp holder; (*b*) serrated end; (*c*) spring-steel jaws; (*d*) applicator handle 8 in. long; (*e*) locking screw; (*f*) screwdriver; (*g*) compression screw; (*h*) slot for applicator jaws; (*k*) compression plate; (*l*) artery; (*m*) adjustable artery clamp.

in the applicator by the spring-steel jaws of the clamp holder as illustrated. The jaws fit in slots in the head of the clamp and are tightened on the clamp by drawing up the serrated end of the clamp holder. When the clamp is firmly held, the jaws are locked by tightening the knurled locking screw on the side of the applicator handle. With the clamp centred in the jaws the screwdriver is automatically guided into the slotted head of the compression screw. It is a simple procedure to hook the artery into the clamp when the compression plate is withdrawn into the top of the clamp. The applicator may then be held in one hand, the thumb and forefinger being used to turn the screwdriver. The other hand is free to palpate the pulse in the artery. The clamp may be freed from the applicator by loosening the locking screw and sliding the serrated end of the clamp holder into the handle, thus allowing the jaws to spread. We found no difficulty in picking up the clamp in the applicator for readjustment or removal some weeks after it had been installed. This type of clamp has been used with complete success in the production of the Goldblatt type of hypertension in many dogs.

A systolic blood-pressure (unanæsthetised animal) of over 200 mm. Hg was considered to indicate a satisfactory degree of hypertension. Before the exchange transfusion all pressures were measured with a mercury manometer by direct arterial puncture (No. 20 hypodermic needle). During the exchange cannulæ in femoral or brachial arteries were used.

In exchanging the blood between two animals it is most important that the same volume be passed in each direction. The ordinary cross-circulation technique would obviously exsanguinate the animal with high blood-pressure into that with the lower pressure. A special pump (fig. 2), described in detail elsewhere (Solandt and Robinson 1938, Thalhimer, Solandt, and Best 1938), was used to accomplish the required

metered exchange transfusion. As shown, a horizontal graduated tube (10 c.cm.) is included in each circuit, so that the movement of a bubble of air, introduced with a hypodermic syringe through the wall of the connecting rubber tubing, could be timed as a means of measuring rate of flow. A trap designed to catch the air-bubble is placed in the circuit distal to the graduated tube. The tubes in the two circuits were placed side by side, so that the balance of the exchange could be checked by introducing a bubble simultaneously into each tube and observing their relative progress. The absolute quantity of blood exchanged could be determined at any time by timing the progress of the bubble. Exchange was from femoral artery to femoral vein in each circuit.

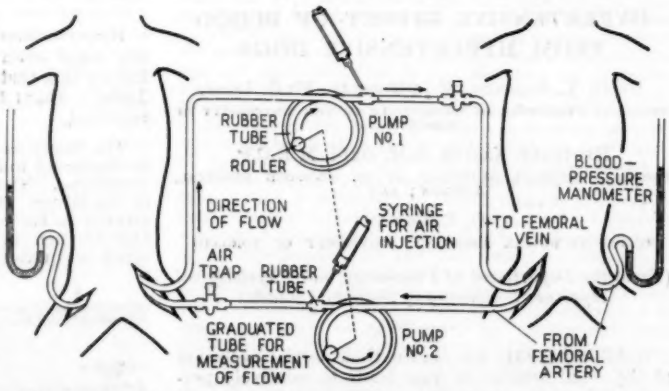

FIG. 2—Plan of exchange-transfusion experiment, showing equal delivery from pumps 1 and 2.

Dogs were used, and surgical anæsthesia was maintained with Nembutal throughout the exchange transfusion. The animals were each given an initial intravenous injection (350 units per kg. of body-weight) of heparin and subsequent hourly injections (50 units per kg.) for the duration of the experiment. Before attempting an exchange transfusion we cross-agglutinated the bloods of the two animals. Dogs with obviously incompatible bloods were not used.

RESULTS

The accompanying table summarises our results. In every case the blood-pressure of the hypertensive dog fell or remained constant; a rise of blood-pressure in this animal was never seen. The blood-pressure in the recipient animal always rose if its kidneys had been removed, but there was no rise if its kidneys were present in the circulation. The rise in blood-pressure produced in nephrectomised animals, although always pronounced, was in some cases of short duration. In other instances it was maintained for several hours. In a few experiments the initiation of exchange produced shock with low blood-pressure in both animals. Unless the blood-pressures showed an immediate tendency to rise, the pump was stopped; when the pressures returned to approximately the original levels, exchange was again started. The cause of this shock is not known. When the exchange was started again, a second shock was never seen. Fig. 3 shows the plotted blood-pressure record of a typical experiment in which initial shock of the type described was seen. In this case the fall in blood-pressure was so transient that it was not necessary to stop the pump. As controls we performed exchange transfusions between normal dogs (20 experiments), between normal and nephrectomised dogs (4 experiments), and between hypertensive dogs with approximately the same blood-pressure (2 experiments). In none of the controls did the blood-pressure of one animal affect that of the other; we never observed a rise of blood-pressure in either animal.

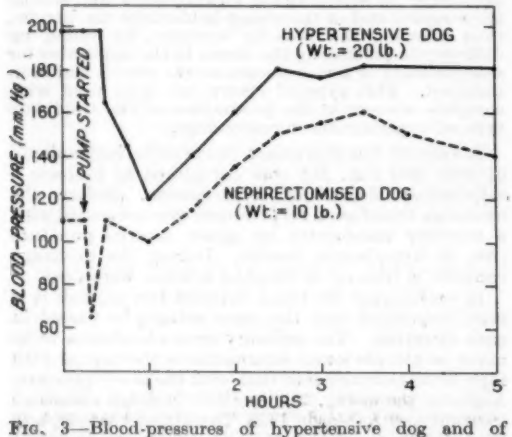

FIG. 3—Blood-pressures of hypertensive dog and of nephrectomised dog during exchange transfusion.

DISCUSSION AND CONCLUSIONS

The results of the foregoing experiments seem to show that an hypertensive substance is present in the systemic blood of dogs having renal hypertension. Katz (1939) probably failed to demonstrate the existence of this substance because he did not exchange enough blood between hypertensive and recipient animals. Our conclusion is verified by the fact that, in general, the heavier the hypertensive with respect to the recipient animal, the greater was the rise of blood-pressure in the recipient. The pooled bloods of two such animals would necessarily contain a higher concentration of the hypertensive substance than would that of two similar animals of equal weight.

Since in the presence of functioning kidneys in the recipient dog no rise in blood-pressure was seen in this animal, we conclude that the normal kidneys in some way prevent the hypertensive substance from exerting its pressor effect.

SUMMARY

The blood of dogs having hypertension produced by the technique of Goldblatt or Greenwood contains a substance which will produce transient hypertension in another dog if the recipient animal is deprived of its kidneys.

We are grateful for the kindly interest of Prof. C. H. Best in these experiments.

REFERENCES

Fasciolo, J. C., Houssay, B. A. and Taquini, A. C. (1938) *J. Physiol.* **94**, 281.
Goldblatt, H., Lynch, J., Hanzal, R. R. and Summerville, W. W. (1934) *J. exp. Med.* **59**, 347.
Greenwood, W. F., Nassim, R. and Taylor, N. B. (1939) *Canad. med. Ass. J.* **41**, 443.
Katz, L. N., Friedman, M., Rodbard, S. and Weinstein, W. (1939) *Amer. Heart J.* **17**, 334.
Page, I. H. (1939) *Science*, **89**, 273.
Solandt, D. Y., Robinson, F. L. (1938) *J. sci. Instrum.* **15**, 268.
Thalhimer, W., Solandt, D. Y., Best, C. H. (1938) *Lancet*, **2**, 554.

SPONTANEOUS PNEUMOTHORAX AND STAPHYLOCOCCAL LUNG ABSCESS

IN AN INFANT

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THE following case is of interest both because of the rarity of the condition and because it presented an intricate diagnostic problem.

CASE-RECORD

A male infant, aged 8 weeks, was sent to Mr. A. Tudor Edwards by Dr. R. H. Dobbs and was admitted to Brompton Hospital on Nov. 28, 1938. The child had been well until ten days before admission, when he developed a paroxysmal cough. During the attacks of coughing he became blue and breathless and for this reason was taken to the Princess Louise Kensington Hospital for Children. Radiography there showed an air-containing space occupying the greater part of the left chest; the mediastinum was displaced to the right. Barium, given by mouth, did not enter this space. In view of the extreme dyspnœa, a needle was inserted into the left side of the chest and released air under pressure. On the following day the baby was transferred to Brompton Hospital.

On admission the infant was dyspnœic and cyanosed. The heart was displaced to the right. There was hyperresonance, with absence of breath sounds, over the left side of the chest, from which 800 c.cm. of air was removed. The intrapleural pressure (+ 8 + 24 c.cm. of water) remained unchanged. After the needle was withdrawn, air could be heard escaping from the site of puncture; this produced some subcutaneous surgical emphysema of the chest wall. However, the dyspnœa was relieved, and thenceforward the infant's condition steadily improved until the time of operation. The temperature was 99° F. on admission and never rose above this level.

Further radiography showed that the collection of air did not reach the left apex. The lateral view showed appearances suggesting coils of intestine in the left pleural cavity, but these were not apparent in the anteroposterior view, and after a barium meal no barium entered the chest. A diaphragmatic hernia, therefore, seemed unlikely, and the air-containing space, being oval and not completely filling the left chest, was thought to be a large pulmonary cyst rather than a pneumothorax. Infection was not suspected, for there was no radiological evidence of fluid in the space. Since the infant's general condition had improved, and because of the severe nature of the previous attacks, it was decided to perform an exploratory thoracotomy without further delay.

Operation.—When the left side of the chest was opened a cystic space was found. The lung was collapsed and lay posteriorly, the thickened pleura over its anterior surface forming the posterior wall of the space. Where the anterolateral aspect of the lower lobe joined the chest wall a bead of pus was seen escaping from a small abscess cavity in the lung. Apart from this there was no fluid in the pleural cavity. It was evident that the space was a localised infected pneumothorax, and the chest was therefore closed. After operation the baby's condition was poor, and he died on the following day.

Necropsy.—The findings at operation were confirmed. The space consisted of part of the pleural cavity bounded by thickened parietal pleura, except posteriorly, where it was formed by thickened visceral pleura covering the anterior surface of both lobes of the left lung. The pleura was very thick in all areas and on section showed œdema, great vascularity, and a heavy infiltration with polymorphs. The pleural cavity contained no fluid. The upper lobe of the left lung was aerated, whereas the lower lobe was collapsed and hæmorrhagic and contained multiple whitish areas. In one of these there was a small abscess cavity, which had ruptured through the pleura. Histological examination showed that these white areas contained minute abscesses, and that there was a diffuse interstitial pneumonia throughout the collapsed lobe. Chains of gram-positive cocci could be seen in the abscess walls, and cultures from the pus and from the lungs yielded a pure growth of *Staphylococcus aureus*. There were no other defects in the body, and no obvious source of infection was found.

SPONTANEOUS PNEUMOTHORAX IN INFANTS

Frequency.—Spontaneous pneumothorax usually occurs between the ages of twenty and thirty years; Perry (1939), in a series of 85 cases, recorded only 3 under the age of ten years.

Ætiology.—It appears from a study of the literature that the common causes of spontaneous pneumothorax in an infant are as follows:—

(1) Early respiratory effort: Bertin (1936) reported 7 non-fatal cases of spontaneous pneumothorax in the newborn, 6 of which occurred before the twelfth day of life. Only 1 of these could be attributed to a difficult labour. Bertin cites Ruge, who postulated that the condition was caused by respiratory efforts against a glottis thrown into spasm by the irritation of foreign material; but this explanation seems mechanically unsound. The size of this group and its frequency in relation to the other causes of spontaneous pneumothorax cannot be computed, because, although few cases have been reported, their mild course and tendency to spontaneous cure make it possible that many examples may have been overlooked.

FIG. 1—Lateral radiogram showing appearance suggesting a loop of bowel above the diaphragm.

(2) Obstetrical trauma: although this is a well-recognised cause, very few cases have been recorded. Strongin (1938) reports a tension pneumothorax developing in an infant four hours after a forceps delivery.

(3) Congenital malformations: these are uncommon. Davies (1934) recorded 5 examples in a series of 26 spontaneous pneumothoraces under the age of three years. Stoloff (1928) did not mention a single instance in his series of 84 cases. Falk (cited by Dupin and Verger 1937) described a spontaneous pneumothorax which was due to a bronchus opening directly on to the surface of the pleura.

(4) Subpleural vesicles: Kjaergaard (1932) has shown that these are a common cause of spontaneous pneumothorax in the adult. They may be emphysematous or congenital, and Stoloff (1928) says that 13 per cent. of spontaneous pneumothoraces in infancy are associated

with emphysematous bullæ. It seems more reasonable to suppose that bullæ at this early age are congenital.

(5) Pulmonary tuberculosis: widely divergent accounts of the frequency of this cause are given by different authors; Falk (cited by Dupin and Verger, 1937) gave it as 19 per cent. and Davies (1934) even higher, whereas Stoloff (1928) did not record a single instance.

(6) Pneumonia and lung abscess: Dupin and Verger (1937) have pointed out that the cause of a pneumothorax in either of these conditions is the same—namely, the rupture of a subpleural abscess. Pneumonia and lung abscess together constitute the commonest cause of spontaneous pneumothorax in childhood. Stoloff (1928) found that they caused 55 per cent. of cases, Davies 40 per cent., and Scott (1928) 20 per cent. In infants under the age of one year the frequency of this cause appears to be even higher; of 10 examples collected from the literature (Bovaird 1903, Ross 1924, Rogatz and Rosenberg 1931, Johnson 1927) 9 were due either to pneumonia or to lung abscess. Debre and others (1937), investigating the cause of lung abscess in children, found that 9 out of their 13 cases were due to pneumococcal infection.

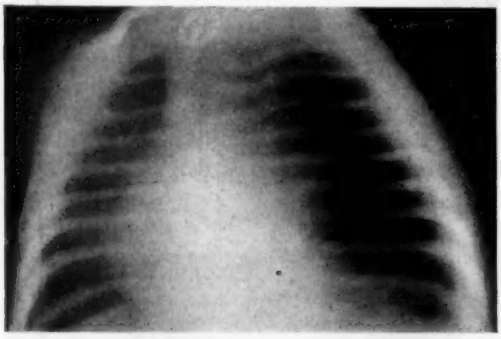

FIG. 2—Anteroposterior radiogram showing a cyst-like space at the base of the left lung.

Clinical course.—This is determined partly by the presence or absence of infection in the pleural cavity; infection inevitably follows rupture of an abscess and develops in nearly all cases of pneumonia. Another important factor is the intrapleural tension; a positive-pressure pneumothorax in an infant causes acute respiratory embarrassment and may be fatal if it is not promptly relieved by aspirating air. The most constant physical signs are hyper-resonance, with diminished or absent breath sounds, on the affected side. Dyspnœa is usually severe and may be paroxysmal. Signs of toxæmia may be present in infected cases. The mortality of spontaneous pneumothorax from all causes in infancy is given by Glaser and Landau (1935) as 50 per cent. Staphylococcal pneumonia in infants is almost invariably fatal.

Differential diagnosis.—A large air-containing space in an infant's chest may be a spontaneous pneumothorax, or a congenital pulmonary cyst, or a congenital diaphragmatic hernia. A diaphragmatic hernia can usually be diagnosed by radiography after a barium meal, but the difficulties of distinguishing between a cyst and a pneumothorax may be very great. A cyst will sometimes show on radiography fine linear shadows due to fibrous septa, and occasionally it is possible to induce a pneumothorax, when the cyst will become visible in the collapsed lung. A pulmonary cyst communicating with a bronchus in such a way that air can enter but not escape may simulate a tension pneumothorax so closely that differentiation between the two becomes almost impossible.

STAPHYLOCOCCAL PNEUMONIA IN INFANTS

Several examples of staphylococcal pulmonary infections in infants are recorded. MacGregor (1936) described 10 cases of staphylococcal pneumonia inchildren whose ages ranged from sixteen days to three and a half years, 5 of them being due to a pure infection with *S. aureus* and having no septic foci elsewhere. All were fatal. The pulmonary lesions consisted of areas of hæmorrhagic consolidation which broke down to form multiple abscesses. Reimann (1933), Wallace (1937), and Hughes (1938) describe similar pathological findings in cases of staphylococcal pneumonia, and multiple abscesses were found in every instance. In the light of these observations it seems probable that the case here described was primarily due to staphylococcal pneumonia with abscess formation and subsequent perforation of the pleura. A remarkable feature was the absence of any fluid in the pleural cavity; the reaction of the pleura to infection seems to have been proliferative rather than exudative.

SUMMARY

A case is described of spontaneous pneumothorax in an infant aged 8 weeks. Necropsy revealed that this was due to the rupture of a staphylococcal lung abscess. The radiological appearances were strikingly similar to those of a pulmonary cyst. It appears from the literature that a pyogenic pulmonary infection is the commonest cause of a spontaneous pneumothorax in an infant under one year of age.

We are indebted to Mr. A. Tudor Edwards for permission to report this case and to Dr. R. L. Rawlinson for permission to reproduce the radiograms.

REFERENCES

Bertin, E. J. (1938) *Radiology*, **27**, 584.
Bovaird, D. (1903) *Arch. Pediat.* **20**, 825.
Davies, W. J (1934) *Med. Times Long Island med. J.* **62**, 237.
Debre, R., et al. (1937) *Ann. Méd.* **42**, 581.
Dupin, J. and Verger, P. (1937) *J. Méd. Bordeaux*, **48**, 497.
Glaser, J. and Landau, D. B. (1935) *Amer. J. Dis. Child.* **50**, 497.
Hughes, W. (1938) *Quart. J. Med.* **28**, 537.
Johnson, F. E. (1927) *Amer. J. Dis. Child.* **33**, 740.
Kjaergaard, H. (1932) *Acta med. scand.* Supp. 43.
MacGregor, A. R. (1936) *Arch. Dis. Childh.* **11**, 196.
Perry, K. M. A. (1939) *Quart. J. Med.* **8**, 1.
Reimann, H. A. (1933) *J. Amer. med. Ass.* **101**, 514.
Rogatz, J. L. and Rosenberg, A. (1931) *Amer. J. Dis. Child.* **41**, 1104.
Ross, S. G. (1924) *Med. Clin. N. Amer.* **7**, 1941.
Scott, A. J. (1928) *Trans. Amer. med. Ass.* section Dis. Child. p. 59.
Stoloff, E. G. (1928) *Amer. J. med. Sci.* **176**, 657.
Strongin, H. (1938) *Amer. J. Dis. Child.* **56**, 110.
Wallace, H. J. (1937) *Proc. R. Soc. Med.* **30**, 885.

REMOVAL OF IMPACTED LOWER WISDOM-TOOTH

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HAVING a tooth out is proverbially simple and, with our improved technique, it is simpler today than ever before. There are exceptions; the greatest is the removal of an impacted third mandibular molar, or lower wisdom-tooth, which may present such difficulty that a planned surgical operation in a nursing-home or a hospital is essential. These cases are now so much in evidence that one wonders what happened to them formerly. It is another instance of improved diagnosis, for many of the cases in young adults used to be diagnosed as quinsy.

A comparison between the anatomical relations of an impacted third mandibular molar and those of the teeth anterior to it emphasises not only the difficulty but also the greater danger of operation. The normally erupted teeth have their roots embedded in alveolar processes covered by mucoperiosteum, the whole forming a ridge attached by its base to the body of the bone and relatively superficial. The impacted wisdom-tooth, on the other hand, is deeply embedded

in the central area of the body of the mandible, is in close proximity to the marrow spaces of the cancellous bone, and is often immediately related to the sub-alveolar canal with the main vessels and nerve of the mandible. Access for operation is difficult.

IMPACTION AND INFECTION

Impaction is due to lack of space into which the tooth can erupt. It is attributed to the shortening of the jaws during the process of evolution. In contemporary man it is chiefly noticeable in the pathological group known to dental surgeons as "postnormal occlusion," popularly recognised as those who have adenoids and receding chins and are mouth-breathers. It is possible that the greater number of impacted wisdom-teeth is associated with an increase of this type.

With normal growth the wisdom-teeth should come into position about the age of seventeen, or a little later, when eruption is indicated by greater fullness of the gum. The gum over an impacted molar, because of the limited space, tends to bulge upwards and is often injured by the opposing molar of the maxilla, which has usually erupted without incident. Superficial infection results from injury and may extend to the deeper structures, with a definite sequence of pathological changes. Local discomfort and trismus are the commonest early symptoms, but another common symptom—unilateral sore-throat—may possibly not be recognised as due to the erupting tooth, although in young adults it is almost pathognomonic; if there is suppuration, a wrong diagnosis of quinsy may also be made.

Infection may lead to comparatively simple lesions or, by extension to the neighbouring parts, to such serious sequelæ as cellulitis in the neck, abscess in the temporal fossa, pharyngeal abscess, and phlebitis of the pterygoid plexus of veins, with or without secondary intracranial infections, such as thrombosis of the cavernous sinus and cerebral abscess. Perhaps the commonest serious sequela is a general septicæmia or a pyæmia. Similar sequelæ may develop after operation, and there is the additional risk from the injury inflicted; in spite of the greatest care being exercised, local effects of injury are common.

The local injury with a variable degree of infection causes pain, swelling, trismus, and necrosis, all aggravated by bad drainage. The pain may persist for some weeks. Necrosis most often affects the outer side and often involves the socket of the second molar; the infection may track forwards beneath the periosteum and be difficult to control even with free incisions. Osteomyelitis with trismus may be present for months. The second molar may be loosened at the operation, or the posterior surface of the root may be exposed, leaving a painful area difficult to treat. Sometimes subsequent removal of this tooth is necessary because of the severity of the injury and infection. Many do not understand how serious a matter this is, and how gravely the loss of a second molar affects the function of that side of the mouth. The unusual, but far too common, sequela of septicæmia or of pyæmia is caused by injury to the bone, particularly the bone beneath the tooth when an elevator is used. The field of operation is of necessity infected and can be compared with that of an infected compound fracture in other bones.

PRINCIPLES OF OPERATION

The disadvantages described led me to criticise my operative procedure, with the following conclusions.

(1) A low drainage-point is essential and is achieved by cutting away the internal or lingual plate of the mandible. At no other site can the disadvantage of gravity be overcome. This has the most important influence on satisfactory recovery and freedom from anxiety after operation.

(2) Injury to the bone must be avoided, the use of an elevator discarded, and the tooth lifted from its bed with forceps. When an elevator is used on cancellous bone beneath the tooth, there is a risk of such conditions as osteomyelitis, pyæmia, and septicæmia. If the compact bone is used as a fulcrum, necrosis often supervenes. Violent use may cause fracture of the mandible.

(3) Improved accessibility is obtained by operating from behind, with the head retracted as for tonsils and adenoids, and better lighting by using a head-mirror. The greater accessibility permits a more careful cleaning up of the wound.

(4) Injury to the second molar and the bone supporting it is avoided by operating from behind.

(5) The cavity produced by operation should be reduced as far as possible. A saucer-shaped depression rather than a deep cavity is aimed at.

(6) The operation should be a planned and controlled surgical procedure, with the patient in a nursing-home or a general hospital, and the patient should clearly understand the severity of the operation.

An important decision has to be made whether operation is necessary and if so when. Some of the factors to be determined are the age of the patient, whether the tooth has caused trouble, and whether there is or has been suppuration. What possibilities are there that a deeply placed tooth will lead to trouble, or can it remain undisturbed? If the tooth is causing even slight trouble, either operation or palliative measures should be undertaken, such as removal of the maxillary third molar, incision of the overlying soft tissues, or removal of the part covering the tooth. Palliative treatment is dangerous, for although there may be no pain infection persists and must be regarded as a definite menace.

NEW OPERATION

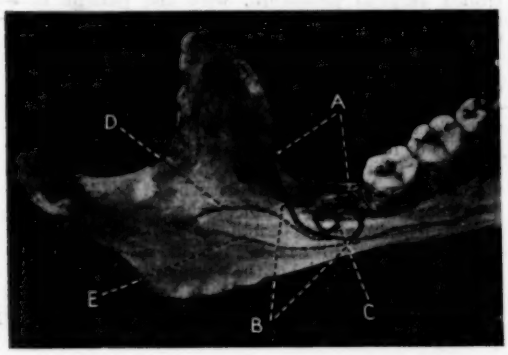
Under ideal conditions, which are not always essential but are desirable, the patient should be admitted to a nursing-home or a hospital, where efficient nursing and a properly equipped operating-theatre are available. The instruments should include, besides the ordinary surgical equipment, a special head-rest; a Boyle Davis, or a special, gag; special long chisels, gouges, and a heavy mallet; forceps and retractors; a sucker; and a viewing-box for X-ray films which have been taken at all important angles.

The ideal operating team should consist of a surgeon, a skilled anæsthetist, two assistants, a theatre sister, and a nurse. The anæsthetic should be intratracheal, with a tube passed through the nose. A long connecting tube should enable the anæsthetist to sit well out of the way. Firm fixation of the tube in the nose is necessary, for it is likely to be disturbed by the surgeon, who must avoid compressing it. The surgeon, using a reflecting head-mirror, is seated at the head of the table, which is tipped until the end rests in his lap. Tilting the table gives a better position than retracting the head. There should be a standard lamp on the right of the table. The first assistant, wearing a head-light and standing on the left, uses the sucker or swabs and holds a retractor. The second assistant supports the patient's chin and Davis gag and holds a retractor. The sister is at the instrument table on the right of the surgeon. The nurse, standing behind the first assistant, hands the swabs. The head-rest determines the exact position of the patient. A long cloth with a hole for the mouth area is best; a folded towel across the upper part of the face is a protection to the eyes.

After the introduction of the gag, the throat is packed with a long strip of damp gauze. The standard lamp and the surgeon's head-mirror are arranged for a complete lighting of the field of operation.

The incision (see figure) is begun on the lingual side, on a level with the floor of the mouth, a short distance behind the second molar, so that a narrow strip of mucosa is left intact behind this tooth. The incision, carried right through to the bone, passes parallel to the roots and posterior surface of the second molar upwards and outwards almost to where the mucosa is reflected on to the cheek; it is then carried backwards towards the coronoid process. If the tooth is showing, the line of the incision should be up to and away from the exposed part. The cut must be made completely down to the bone and the flap carefully and cleanly marked out.

The flap (see figure) is raised by cutting the firmly attached fibres from the bone with a sharp chisel, with



Stages in removal of impacted lower wisdom-tooth: A, the line of incision; B, the line of reflection of the flap to expose the bone; C, outline of first piece of bone to be cut away on the inner and posterior aspect of the tooth; D, the internal oblique line, beginning at the inferior dental foramen and running forwards and downwards, its upper branch running along towards the inner side of the molar teeth. (This ridge forms the acute angle described in the text as produced by the eversion of the mandible, and the lingual nerve lies immediately below this ridge at the back of the wound); and E, the subalveolar canal, containing the vessels and nerve, with which the tooth is often in close contact.

short pushes and without the edge of the chisel being allowed to leave the surface of the bone. Separation is not difficult, except on the lingual side, where the eversion of the mandible (see figure) is often of such a degree that this surface and the upper one form so abrupt an acute angle that, unless great care is taken, the soft tissues are injured. A free exposure of the bone constitutes one of the features of the operation. If the soft tissues are carefully separated, the muscular insertions are in no way disturbed. Tearing of the muscle-fibres causes an annoying and persistent hæmorrhage. Free retraction of the flap may demand an additional nick in the tissues, for the surface of the bone must be freely exposed.

When the tooth is deeply situated and a considerable area of bone is laid bare, the muscular insertions of the superior constrictor, the buccinator, the masseter, or the temporal muscle may be involved. The complete separation of the tissues from the bone, including parts of the insertion of any of these muscles, is most important; not only is the hæmorrhage just mentioned avoided, but also the after-pain is reduced and the healing of the wound is more satisfactory.

Removal of bone is effected by cutting away small wedges from behind and on the inner and outer aspects of the tooth. I find long chisels and gouges and a heavy mallet the most effective. The first cut is made across the back part of the angle between the lingual and upper surfaces (see figure). This should, if possible, be carried through to the tooth, and by continuation from this point forwards on the lingual side of the tooth the low drainage-point, so essential to the operation, is achieved. The variable position of the tooth will affect the details of bone removal; but, whatever the position, sufficient bone must be cut away to allow the tooth to be taken out in a direction away from the second molar. Forceps may be applied to test the resistance and to determine whether more bone needs to be removed. Removal of a small wedge of bone on the outer side of the tooth is nearly always necessary to allow the application of the outer blade of the forceps.

The cavity in the bone, when the tooth is comparatively superficial, is easily rendered saucer-shaped, and drainage presents no difficulty; but, if the tooth is deeply situated, so that the cavity is below the level of the floor of the mouth, considerable care is needed to close the wound in such a way that drainage is not impeded. Deep cavities often lie in close proximity to the subalveolar canal. Numbness of the lip may follow any operation; but, if the injury has not been severe, recovery readily takes place.

The use of an elevator under these conditions is particularly undesirable. In these deep wounds the lingual nerve is commonly exposed, but, if it is carefully retracted, there is no reason to be perturbed. Vigorous retraction may cause a disturbance in sensation in the tongue. As already stated, there is no necessity to disturb the second molar, even when the third molar is in very close contact, but it must be emphasised that such cases demand particular care.

Removal of the tooth is effected with forceps. Special forceps are necessary, and many with the necessary curves will be tried. A deeply placed tooth can be difficult to grasp, and not infrequently upper-molar-splitting forceps will be found to provide the necessary grip. It may be thought desirable to split the tooth, and splitting forceps are preferable to a heavy chisel. The force of a blow on a heavy chisel is less controlled and apt to injure the bone. Some dental surgeons favour the use of a bur or drill in a dental engine.

There are occasions when an elevator may be employed, but the second molar, or the bone separating it from the third molar, should never be used as a fulcrum. The elevator should be used from behind, and the bone from which leverage has been obtained should be cut away. It is necessary to resist the temptation of using considerable force, for the time occupied by the operation could be considerably reduced in this way. It is only justifiable if one can be sure that the after-effects are not going to be impaired. There is much self-deception about the amount of force used with an elevator. Bone injured by pressure becomes readily infected, as is well demonstrated by the subsequent necrosis so often seen on the outer surface and extending to the second molar, when an elevator has been used.

Cleaning up of the wound.—Swabbing with a 1 in 2000 solution of flavine renders visible any small particles which may be left. The wound must be widely retracted and every possible point explored for fragments of bone or of tooth, if it has been broken. The subsequent healing is greatly helped by the removal of every loose fragment. Any overhanging edges of bone should be rounded off and the replacement of the flap kept in mind when doing so.

Closing the wound with the flap.—The flap of mucosa should be tested to see how much of the cavity in the bone can be covered by it. Should there be much retraction, or if there is a tendency to oozing, a stitch may be advisable. The flap is held in place by a pad of gauze, a long strip being used and a considerable wad introduced, so that, when the jaws are closed together, compression is exerted by pressure against the maxilla. The end of the gauze is passed along the sulcus of the cheek to the angle of the mouth. When a stitch has been used, it should only be loosely tied, so that there is no interference with the compression of the soft tissues into the bony cavity. The tension on the flap tends to pull on the palate rather than on the floor of the mouth. Care must be exercised to avoid tension, for considerable pain may be caused later by any movements of the palate. Should there be after-pain when a stitch has been introduced, it is well to remove it the next day; otherwise catgut can be left, for it becomes absorbed.

After-treatment.—Morphia is given after a severe operation if there is likely to be discomfort or to keep the patient quiet. It is usually unnecessary, but is often of more value after than before an operation. The pad of gauze is retained for as long as possible, but often the patient spits it out on recovery from the anæsthetic. It is unnecessary to introduce another pad unless there is some hæmorrhage, which should not occur. Gentle irrigation is begun on the day after the operation. It is best effected with a long piece of rubber tubing on the nozzle of a syringe or an irrigator. It is passed along the sulcus of the cheek and the fluid allowed to wash gently over the surface of the wound. Force should always be avoided. It causes pain and may break down the blood-clot. The lotion used for irrigation is not of great importance, but I have found that half a tumblerful of a 1 in 120 solution of phenol, to which 10 minims of tincture of iodine has been added, is satisfactory and pleasing to the patient. When the mouth can be opened without discomfort, syringing from the lingual side is usually more effective.

SUMMARY

Operation for removal of a third mandibular molar should be regarded seriously because of the anatomical position of this tooth and its relation, if impacted, to the body of the mandible. Operation in a nursing-home or a hospital is imperative for difficult cases and often desirable in others. The great difficulty of drainage in these cases is met by operating through the lingual plate, which considerably reduces the risk of the operation and almost completely avoids after-pain and other ill effects. Removal of the tooth with forceps instead of with an elevator prevents injury to the bone beneath the tooth and is very rarely followed by necrosis, although the improved drainage and the less likelihood of infection are also important factors in preventing necrosis.

By operating from behind and by using a head-mirror, greater accessibility and better lighting are obtained, the second molar remains undisturbed, and the wound can be satisfactorily cleaned up. The reduction in the size of the wound by cutting away overhanging bone and compressing the flap of mucosa into the cavity allows healing to take place more readily. From experience, now of several years, it is remarkable how little pain follows the operation, and none of the serious sequelæ, such as osteomyelitis and septicæmia, has yet developed.

The chief complaint of the patient is soreness of the throat; it can be caused by stitching too tightly.

The operation was first described to the odontological section of the Royal Society of Medicine in December, 1935. Since then modifications have been introduced from experience gained. Many operations have been performed, and statistics might be given; but the variation in type has been so wide that little can be conveyed by a quotation of figures.

I am indebted to Mr. Forsyth Whaley and to my colleagues and house-surgeons at the Middlesex Hospital for their help.

BIBLIOGRAPHY

Bennett, N. (1931) Science and Practice of Dental Surgery, vol. 1, London.
James, W. W. (1935) *Proc. R. Soc. Med.* **29**, 85.
— (1937) *Brit. dental J.* **63**, 450.
— (1939) *Ibid.* Sept. 1, p. 217.

TREATMENT OF DROPSY WITH MERCURIAL DIURETICS AND UREA

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THE chief progress in cardiac therapy during the last few decades has been the development of mercurial diuretics, which has led to definite prolongation of the average life of patients with cardiac failure. A new type of patients has arisen—cardiac invalids with chronic metabolic imbalance of their body fluids living for an indefinite time but entirely depending on regularly repeated injections. The interval between injections is determined by the amount of diuresis produced, by strict and often worrying restriction of the fluid intake, and by the output of urine between the injections. Unfortunately mercurial diuresis, however copious, is often followed by postdiuretic oliguria, and this factor necessitates repetition of the injections at short intervals, which is neither agreeable for the patient nor rational for cardiac treatment as a whole. We therefore sought to raise the output of urine in the intervals between two injections. The usual theobromine compounds almost invariably failed to do this, and dietetic measure proved on the whole equally unsatisfactory. We then remembered urea, a remedy used in cardiac and hepatic dropsy long ago. The uneven side-effects obtained with the large doses previously employed and the patient's dislike of its taste had led to its being almost entirely abandoned on the introduction of Novasurol and its successors. We thought, however, that in patients who had lost their œdema by the parenteral injection of mercurials it would perhaps require smaller quantities to maintain their fluid balance than in those desperate cases in which we had used it previously. We were encouraged in this by an observation made by one of our patients with cirrhosis of the liver due to long-standing rheumatic mitral and tricuspid valvular disease. This patient, taking a small daily dose of urea previously prescribed by one of her doctors, managed to remain quite well for some time without Novurit, which by this time she had been obliged to have at regular intervals.

EXPERIMENTS AND RESULTS

We started our experiments with patients who had been under regular mercurial treatment for a sufficiently long period. They were practically free from œdema on the days following injection. Novurit 1–2 c.cm. or Esidrone 1 c.cm. was injected intravenously with or without the administration of ammonium chloride 4–6 g. on the day before and the day of injection.* Urea therapy was started twenty-four to

* The effect on diuresis of 4–6 g. of ammonium chloride, although it is converted to urea in the body, does not affect urea diuresis. The amount of urea formed by 4–6 g. of ammonium chloride, according to the formula $2\,NH_4Cl + CO_2 = (NH_2)_2CO + 2\,HCl + H_2O$, is 2·24–3·37 g.—i.e., much less than the minimal effective dose (about 20 g. daily).

forty-eight hours after an injection, according to whether diuresis had lasted twenty-four hours or longer, 20–40 g. being given daily, the whole amount being dissolved in a single cup of strong unsweetened coffee, which concealed the bad taste of the drug much better than did fruit juices or the like. Most of our patients took this without protest, even when the dose had to be increased. There were no unfavourable side-effects in any of our cases, from which renal insufficiency and nitrogen retention of other origin had been excluded. Diuresis was invariably produced, the effect appearing on the first or second day. An increase of urinary output, however, is not always accompanied by an equal improvement in the fluid balance. This fact did not surprise us, as we had found before that different diuretics vary in this respect. We believe that two factors may be responsible—namely, invisible perspiration and thirst, both of which are affected to various extents by different diuretics, as shown schematically in the following table.

EFFECTS OF DIFFERENT DIURETICS ON FLUID BALANCE

Diuresis produced by	Increase in output of urine	Loss of body-weight	Increase in extrarenal fluid output*
General measures—e.g., rest, diet, and theobromine	None or +	None or +	None or slight
Digitalis, strophanthin ..	+	++	+
Mercury injected parenterally	+++	++	None
Urea	++	+	None

* Measured by the rough formula: loss of weight = extrarenal + renal fluid output − fluid intake.

To estimate the diuretic power of a drug it is better to observe carefully the body-weight rather than only the output of urine. In most of our cases we succeeded not only in producing diuresis but also in preventing the rapid reaccumulation of fluid after each injection.

ILLUSTRATIVE CASE-RECORDS

CASE 1.—A male, aged 77, with general arteriosclerosis, hypertension, severe cardiac failure, and long-standing dropsy. Refractory to digitalis. Regular injections of novurit with strophanthin, after previous administration of ammonium chloride, every 5th to 7th day since October, 1937. No effect from theobromine by mouth, Euphyllin (Byk) and Deriphyllin (Homburg) or from Diuretysat (Buerger). More than a hundred injections had been given before we started urea on April 12, 1939. A daily dose of 20 g. was given. The patient did not object to taking urea over a long period and did not complain of the bad taste or of increased thirst. Last injections before urea were given at intervals of 7, 6, 7, 7, 7, 7, 6, 7 and 7 days; after urea injections were given at intervals of 9, 10, and 11 days. The weight remained stationary; no œdema and no dyspnœa appeared. Other attempts to lengthen the periods between injections had failed previously.

CASE 2.—A male, aged 67, with coronary sclerosis, auricular flutter, cardiac failure, general dropsy, and visceral congestion. Tolerance for digitalis restricted. Fair reaction to treatment with combined injections of esidrone (Ciba) and strophanthin. Sinus rhythm restored, œdema removed. To maintain this condition, however, strophanthin had to be continued at 4-day intervals and esidrone at 8-day intervals. Urine output was measured, and weekly variations of body-weight were checked. From March 1, 1939, urea 20 g. daily was given through March and April. Urinary output was increased from 570–710 c.cm. to 1150–1350 c.cm. on the days on which no injections were given. Strophanthin had to be continued, but esidrone could be discontinued until the end of our observation—i.e., for 2½ months. Similar attempts to withdraw esidrone had failed previously.

CASE 3.—A male, aged 57, with severe aortic stenosis, gross myocardial impairment (confirmed by electrocardiography), cardiac failure, and frequent angina. Indoors for the last two years. The last previous therapy consisted in the administration of digitalis folia 0·15 g. daily, which did not prevent œdema and nocturnal angina referred to the left arm and shoulder, making sleep nearly impossible and requiring strong analgesics, nitroglycerin being of little value. Novurit with ammonium chloride had to be given at regular weekly intervals to prevent retention of fluid. With abundant diuresis pains in the left arm vanished for thirty-six hours after every injection, thus showing in this case the close relation between myocardial failure and insufficiency of coronary circulation. Mercurial injections had been given regularly since January, 1938. Several attempts to abandon its use ended in deterioration of the patient's condition. Urine and weight were measured by the patient. The urine amounted to 4–5 litres after injections and 500–700 c.cm. in between. Urea 20 g. daily was started on March 18, 1939. Urinary output rose to 1000–1500 c.cm., which enabled us to prolong the periods between injections from 7 to 14 days and later on, with a daily dose of 40 g., to an interval of three weeks. The body-weight remained on the postinjectional level, and the nocturnal angina did not appear for 10 days after each injection. After two months the patient complained of a sudden dislike of the taste of the medicine; hence it was withdrawn temporarily.

We have not been able to continue with our experiments on a larger scale owing to external circumstances. But the promising results in these and other cases encourage us to publish them so that others may check them independently.

SUMMARY

Urea in single daily doses of 20–40 g. is recommended for combined use with mercurial injections to prolong the periods between injections in cases of cardiac dropsy.

AT the general meeting of the British Empire Leprosy Relief Association held on May 6, under the chairmanship of Mr. Malcolm MacDonald, Secretary of State for the Colonies, Sir William Peel, chairman of the executive committee, described Dr. Ernest Muir's African tour (see *Lancet*, March 2, 1940, p. 422) and announced his forthcoming visit to South America and the West Indies. He further reported that excellent clinical and research work on a large scale is being done in India, under the general guidance of the Indian council of Belra. Special attention is being paid to leprosy in childhood. The number of lepers in Burma is estimated at 150,000 and is increasing. In wealthy colonies, such as Malaya, the local government has been able to give unstinted support to anti-leprosy measures, but in other places Belra has to depend largely on missions and other societies, especially Toc H. Dr. Muir said that the association's two aims are to study leprosy in the various parts of the Empire and to advise all the governments concerned and those who are more directly responsible for combating leprosy. The association send out their medical secretary to visit isolated workers, to make brief studies of their particular problems on the spot, and to encourage them in their work. One of the most important results of this village work is that, besides leprosy, complicating diseases, such as malaria, dysentery, and venereal disease, are also tackled; the people are taught sanitation; and defective diet and other causes of malnutrition are studied and, if possible, corrected. Dr. Muir added that within the last few months he has been in touch with doctors at the Leprosy Institution at Chiengmai, N. Siam, where experiments have been made along entirely new lines. The results obtained appear to be most promising and Dr. Muir has arranged for trials to be repeated in four of five centres throughout the world.

REVIEWS OF BOOKS

Peripheral Vascular Diseases

By WILLIAM S. COLLENS, M.D., chief of the clinic for peripheral vascular disease and of the diabetic clinic, Israel Zion Hospital, Brooklyn; and NATHAN D. WILENSKY, M.D., assistant in the clinics. London: Baillière, Tindall and Cox. 1939. Pp. 244. 25*s*.

IN the first half of this monograph the authors outline the anatomy, physiology and pathology of the peripheral vascular system and describe the methods of investigation and diagnosis of peripheral vascular diseases. An account of the various conditions follows, with a particularly good description of thrombo-angiitis obliterans and the Reynaud phenomenon. The second half of the book is about treatment. Too much space is given to medical and physical methods —no less than forty different therapeutic agents or procedures are discussed, including such bizarre pastimes as subcutaneous injection of carbogen gas, intra-arterial injection of Neo-iopax, and iontophoresis. Under surgical methods the modified operation of preganglionic sympathectomy of the upper limb is described. A critical discussion of the value of sympathectomy in peripheral vascular disease would have been a welcome addition. There are a number of illustrated reports of cases treated by intermittent venous occlusion, a procedure first applied to peripheral vascular disease by the authors, and these leave little doubt of the effectiveness of this treatment in certain patients. The account would be more convincing, however, if the observations were more strictly controlled and fuller figures were given of failures and successes. More information might also have been given about the selection of cases for treatment and the criteria on which a successful result may be expected. Nevertheless, this is a useful book, and the excellence of its arrangement and illustrations compensates for the rather discursive style.

Leprosy

(2nd ed.) By Sir LEONARD ROGERS, M.D. Lond., F.R.C.P., F.R.C.S., F.R.S., I.M.S. (retd.), late physician and lecturer, London School of Tropical Medicine, and professor of pathology, Calcutta Medical College; and ERNEST MUIR, M.D. Edin., F.R.C.S., medical secretary, British Empire Leprosy Relief Association, late research worker in leprosy at the School of Tropical Medicine and Hygiene, Calcutta. Bristol: John Wright and Sons. 1940. Pp. 260. 15*s*.

FIFTEEN years have elapsed since the first edition of this book appeared, and during that period great progress has been achieved not only in our knowledge of leprosy but also in our methods of treatment. In the clinical section the new nomenclature of the 1938 International Leprosy Congress in Cairo has been adopted and the book embodies the lessons of long clinical experience in India and of the recent tours undertaken in Africa by Dr. Muir on behalf of the B.E.L.R.A.

History shows that leprosy slowly spreads over the globe by extending to countries previously free while disappearing in the temperate-zone areas of Europe. The present distribution of leprosy and its relation to latitude and rainfall is here given in detail and repays intimate study. It is not generally realised how menacing is its spread in West and Central Africa; in Nigeria, for instance, Muir has estimated the number of lepers as 200,000 or 10·5 per 1000 of the population. Nauru in Oceania presents the latest and most striking example of the spread of the disease in a small native community. Introduced in 1912, by 1925 no less than 30 per cent. of the 2500 native Nauruans showed signs of leprosy. The total number of lepers in the world is now estimated at 2,500,000, and even this is probably an underestimate.

The authors follow their general survey with well-balanced accounts of the bacteriology of leprosy, its paths of spread and distribution in the body, of the vexed question of immunity, and of the clinical appearances. Finally all aspects of modern treatment are set out in detail, and there are a number of useful appendices on the preparation of the esters of chaulmoogra, a description of the "lepromin" and other tests, and the methods of conducting a leprosy survey. The 81 illustrations include a number of excellent photographs of clinical cases. Altogether the book is terse, accurate and readable, and it has a strong claim to be the best account of leprosy in this or any other language.

Yearbook of General Therapeutics

Edited by BERNARD FANTUS, M.S., M.D., professor of therapeutics, University of Illinois College of Medicine; and LEROY HENDRICK SLOAN, S.B., M.D., F.A.C.P., professor of medicine at the university. Chicago: The Year Book Publishers; London: H. K. Lewis and Co. 1940. Pp. 532. 12*s*. 6*d*.

THIS useful collection of sizeable abstracts of papers of practical therapeutic interest follows the style of its predecessors. Sulphanilamide, sulphapyridine and related substances retain the front rank among notable recent advances. Their powers and limitations are being worked out in greater detail and with greater accuracy. The same is true of many other forms of treatment dealt with in the book. Few of them are really new; many are extended applications of familiar drugs or procedures. There is much about oxygen treatment, and about transfusion of blood, fresh or stored. The effect of vitamin B_1 is being tested in forms of neuritis other than alcoholic; nicotinic acid will relieve the mental symptoms of elderly, arteriosclerotic and undernourished patients; benzedrine has benefited intractable hiccup; and so on through observations too numerous to mention. There is a short section on toxicology and a fairly long one on "non-pharmacal therapeutics." The latter includes reference to a search, by the senior editor and a colleague, for something that will protect the skin from sunburn; yellow petrolatum and titanium dioxide were the best protectives among many tested, and formulæ are given for their incorporation into various skin-coloured preparations. Few readers will fail to find some new and useful item in this volume.

Traité de l'immunité dans les maladies infectieuses

(2nd ed.) By JULES BORDET, director of the Pasteur Institute of Brussels. Paris: Masson et Cie. 1939. Pp. 879. $3.90.

AFTER twenty years Dr. Bordet has at last found leisure to revise this great work, and its appearance is doubly welcome because few books on immunity have been published in recent years. As might be expected, a good deal of modification and enlargement has been necessary. The book is divided into four parts. In the first Dr. Bordet discusses the general character of immunity processes, and includes a section on local immunity. The second part deals with cellular immunity, and the third sets out at length and in admirable detail theoretical and established facts about humoral immunity. The fourth part will

particularly interest the practising physician, for here the author views immunity processes as a whole and explains their practical application to a multiplicity of individual diseases of infective origin. The last chapter of this section is reserved for the difficult subjects of anaphylaxis and allergy, the latter particularly in relation to tuberculosis. Both immunologists and clinicians will appreciate Dr. Bordet's lucid style and his orderly presentation of the facts and the opinions based on his wide experience. A bibliography and a detailed table of contents is given but the absence of an alphabetical index is a rather serious defect in a book of this size.

Manual of Neurohistologic Technique

By OSCAR A. TURNER, M.D. New Haven, Conn. London: Henry Kimpton. 1940. Pp. 73. 10*s.* 6*d.*

THIS technical handbook includes a selection of the principal methods required for the special examination of the nervous system, preference being given to those stains that require the least experience on the part of the manipulator. Many will be new to workers in this country since they are modifications recently brought out in the United States. Amongst these Bodian's stain for nerve-fibres in paraffin sections is particularly useful and deserves to be more widely known. Nieto's method for spirochætes is also a recent prescription which has been recommended. The older Herxheimer formula using sodium hydroxide in the scharlach R stain for fat should however be given up in favour of the mixture of alcohol and acetone. There are some rather obvious gaps in this work as a whole. Thus the only embedding method given is the one for gelatin which, incidentally, is prescribed in unnecessarily strong solutions. The section on the metallic stains for glia is slight. The double and triple impregnation methods with silver carbonate are too valuable to be omitted. Such techniques as are described are sufficiently full and clear.

Worth's Squint

(7th ed.) By BERNARD CHAVASSE, D.M. Oxfd, surgeon, eye department, Liverpool Eye and Ear Infirmary; lecturer in ophthalmology, University of Liverpool. London: Baillière, Tindall and Cox. 1939. Pp. 688. 25*s.*

IN rewriting this classical textbook Mr. Chavasse has approached the problems of squint from a novel and attractive angle. Through certain facts of comparative anatomy and embryology and some observations in comparative physiology he traces the basic causes of the condition. He has a new conception of the phylogeny, ontogeny and physiology of the binocular reflexes and from these foundations he discusses a new pathology in which all varieties of squint appear as perversions and subversions of the normal binocular reflexes, produced by various obstacles operative during the developmental period and after. He has made a much needed and laudable effort to clear up the muddled ideas and inappropriate terms that have been applied in the last few years to several aspects of this subject, in particular to orthoptic training. His views are well balanced and are particularly progressive and refreshing in the field of operative surgery. He discusses the importance of early and sometimes repeated operation in young children or even infants, such treatment being directed to the most rapid and complete resumption of normal activities and to the prevention of local secondary deformities and secondary perversions of the central nervous control. The steps in surgical operations are illustrated by prints from cinematograph films, and various types of squint are also explained in this way. The young ophthalmic surgeon whose physiological knowledge is still fresh will particularly enjoy this book.

Guide to Ophthalmic Operations

By J. BRUCE HAMILTON, M.B. Sydney, D.O., D.O.M.S., hon. ophthalmic surgeon to Royal Hobart Hospital. London: H. K. Lewis and Co. 1940. Pp. 202. 10*s.* 6*d.*

THE title of this book is misleading. It is not a guide to ophthalmic operations so much as a compilation of notes and lists of instruments, dressings and medicaments required for all the commoner eye operations. It will give nurses some guidance to the surgeon's requirements and the care of the patient before, during and after an eye operation. There is much useful information about the care of instruments and their sterilisation and the preparation and sterilisation of dressings, drops and ointments used in eye surgery. The book could have been enlivened by a brief description of the principles and object of each eye operation, with a few clear illustrations to help the nurse appreciate the surgeon's purpose and the use to which he puts his selected instruments.

Aids to Psychiatry

(4th ed.) By W. S. DAWSON, M.D. Oxfd, F.R.C.P., D.P.M., professor of psychiatry, University of Sydney. London: Baillière, Tindall and Cox. 1940. Pp. 320. 4*s.* 6*d.*

IT is a pity that Professor Dawson has not brought this little book more up to date. As it stands it is mainly a presentation of psychiatry as it was taught in England fifteen or twenty years ago. A glance through the chapter headings shows this clearly. Old-fashioned Kraepelinian terminology persists—for example, dementia præcox instead of schizophrenia, with separate chapters on paraphrenia and paranoia, manic depressive psychosis, where affective psychoses would have been better and more in accord with modern views. The chapter on heredity is too brief and somewhat misleading, and important recent work in this field is ignored. No doubt the compass of the book makes a certain amount of distortion inevitable, for its material is notoriously difficult to present simply.

The Cyclotron

By W. B. MANN, B.Sc., Ph.D., lecturer in physics in the University of London at the Imperial College. London: Methuen and Co. 1940. Pp. 88. 3*s.*

THE late Lord Rutherford used to say that C. T. R. Wilson's cloud chamber for making visible the ionisation tracks of individual atoms and electrons was the most wonderful scientific instrument ever devised. There would be others constrained to use the same remark about the cylotron—the ingenious device for getting up speed on any electrified particle by methods which could only have been devised and carried into effect by one with a real experimental flair; such a man is Prof. Ernest O. Lawrence who contributes a foreword to this book. Dr. Mann writes with lucidity as well as enthusiasm, and the reader is given just enough history and just enough mathematics for him to get a grasp of how this machine is constructed, how it works, and what part it is likely to play in experimental physics and biology.

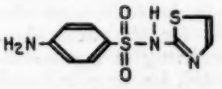
BRITISH POSTGRADUATE MEDICAL SCHOOL.—An intensive course in war medicine will be held at the school from May 27 to 31. The course is free to officers of the armed forces. Further particulars may be had from the dean of the school, Ducane Road, London, W.12.

THE LANCET

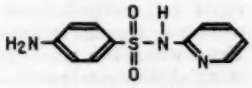
LONDON: SATURDAY, MAY 11, 1940

SULPHATHIAZOLE

IT has been freely predicted that the successes of sulphanilamide and sulphapyridine in the treatment of bacterial infections would lead to therapeutic claims for other similar compounds which the chemists can readily prepare. Such a compound is 2-(para-aminobenzene-sulphonamido) thiazole, a preparation in which sulphanilamide is linked to thiazole, a heterocyclic compound, in the same way as it is linked with pyridine in sulphapyridine.



Sulphathiazole



Sulphapyridine

This preparation, provisionally called sulphathiazole, and its 4-methyl derivative (sulphamethylthiazole) have been distributed in America for experimental and clinical trial, although not yet released in the open market. Early tests [1] suggested that sulphathiazole and sulphamethylthiazole were more effective than sulphapyridine in staphylococcal infections, and HELMHOLTZ [2] has lately shown that in vitro the urine of patients receiving these drugs is bactericidal for both *Staphylococcus aureus* and *Streptococcus fæcalis*. Another report [3] from the Mayo Clinic on the results obtained with these two preparations in urinary infections caused by coliform bacilli (15 cases), *Strep. fæcalis* (7 cases) and *Staph. aureus* (5 cases) claims a 65 per cent. cure. These findings naturally prompt us to ask how these new drugs compare in activity and toxicity with those already in use for the treatment of bacterial infections. PERRIN LONG [4] has presented a report to the American Council on Pharmacy and Chemistry which summarises the available American data on these two points. It seems, as Dr. BUTTLE points out on another page, that in experimental pneumococcal infections the new drugs are rather less effective than sulphapyridine, in streptococcal infections they are about equal, and in staphylococcal infections (which are more difficult to assess) they are somewhat superior to sulphapyridine. Clinical data from America on the treatment of infections due to these bacteria are, with the possible exception of staphylococcal infections, still too scanty to allow an opinion on the usefulness of these preparations. However, a similar product called Ciba 3714,[5] has been clinically tested, in doses similar to those adopted for sulphapyridine, in a variety of bacterial infections by GSELL.[6] Among 60 patients with pneumonia, of whom 23 had lobar pneumonia and the others bronchopneumonia and postinfluenzal pneumonia, there was in general a rapid amelioration of symptoms and only 1 death, while 7 cases of acute cerebrospinal fever all recovered. The concentration of the drug in the cerebrospinal fluid was 4–6 mg. per cent., some 50–60 per cent. of the blood level. Cases of gonorrhœa, erysipelas, and coliform pyelitis and cystitis were also treated with success but 2 cases of generalised staphylococcal infection failed to respond. Staphylococcal infections are indeed likely to be a stumbling-block for chemotherapy because of their great tendency to form localised abscesses. If it is to be effective the drug must be given very early, for without surgical drainage it has little chance of success once pus has accumulated.

As regards its pharmacology and toxicity, sulphathiazole is readily absorbed from the bowel and quickly excreted, while a smaller percentage of the drug becomes acetylated and inert than is the case with sulphapyridine, although experience with the latter drug shows that the proportion of conjugated drug varies greatly in different individuals. With doses of 4 to 6 g. of sulphathiazole per day the concentration in the blood seems to range between 3 and 5 mg. per cent.[7] (the Swiss workers claim higher levels), and higher concentrations are difficult to maintain despite increases in the amount of drug prescribed. This is presumably due to the rapid excretion of the drug, and may be a point of some practical importance, especially in severe infections. Experimentally in mice the chronic toxicity of sulphathiazole is greater than that of sulphapyridine, while the sodium salt of the methyl derivative is as acutely toxic as the corresponding salt of sulphapyridine. In man, nausea and vomiting are less common than with sulphapyridine, and according to both the Swiss and American investigators are never severe enough to interfere with the use of the drug, even with doses of 8–12 g. per day. If confirmed, this is a point definitely in its favour. Drug rashes and drug fever are quite common, and some patients have shown an acute congestion of conjunctiva and sclera in association with a rash resembling that of erythema nodosum. Hæmaturia has been noted in several cases, and is more likely to occur with sulphamethylthiazole which is poorly soluble. In other words the toxic effects are much the same as those produced by sulphapyridine except that the latter drug is more liable to cause vomiting.

The position with regard to the new preparations is admirably summed up by LONG: "The evaluation of these new chemotherapeutic compounds," he says, "will necessitate extensive

1. See *Lancet*, Jan. 20, 1940, p. 137.
2. Helmholtz, H. F. *Proc. Mayo Clin.* Jan. 31, 1940, p. 65.
3. Pool, T. L. and Cook, E. N. *Ibid*, Feb. 21, 1940, p. 113.
4. Long, P. H. *J. Amer. med. Ass.* March 9, 1940, p. 870.
5. Hartman, M. *Schweiz. med. Wschr.* April 20, 1940, p. 337; Meier, R., Allemann, O. and Merz, E. *Ibid*, p. 338.
6. Gsell, O. *Ibid*, p. 342.
7. Reinhold, J. G., Harrison, F. F. and Schwartz, L. *Amer. J. med. Sci.*, March, 1940, p. 393.

experimental and clinical investigations in order to determine their efficiency in the control of infections and their clinical toxic manifestations. Until the time when such data are in hand, it is to be hoped that enthusiasms do not outrun common sense."

THE WOMAN WAR-WORKER

THE controversy over the rates of wages to be paid to women who replace men in war-time jobs is a side-issue of the great national effort, which requires an equitable settlement if the machine is to run smoothly. The first round has been won by the women bus and tram conductors who have been allotted by the Industrial Court the same "rate for the job" as the men they replace, provided they are over 21 and have given six months' service, while in the negotiations now proceeding for the admission of women to the engineering industry the Amalgamated Engineering Union are insisting on equal pay for equal work. The argument between the transport workers and the employers—in this case the municipal authorities—followed traditional lines. The familiar allegation that absenteeism for physical reasons was commoner among women than among men was reviewed but not accepted by the court, and indeed it is more difficult to establish this statistically than would appear at first sight, though it is true that where comparable conditions exist (which in peace-time is rarely the case) the rate of absence for sickness among women is almost invariably higher than among men. Among London teachers for example the number of days lost per head averages steadily about 8 per annum for women and 4 for men. Among industrial workers the rate for both sexes is usually higher, but the differential rate between the sexes is variable and may be less than among teachers. The court may have considered that the difference does not justify a diminution in the standard rates for women. It must also be remembered that sickness-rates vary far more with age than with sex. Sir HENRY BASHFORD [1] has shown that in the Post Office men between 40 and 60 incurred 55 per cent. more sickness-absence than men under 40, and women over 40 incurred 58 per cent. more than women under that age. But in war-time the average age of the women substitutes will be lower than that of the men left in the transport services or in the factories, so that the sickness-rates should not be very different.

Once rates of pay are settled employers and unions would do well to get together without delay and consider how to get the best out of the women engaged in arduous and unfamiliar tasks. The experiences of the last war showed that the presence or absence of amenities has more influence on the output of women than of men. For women a skilled medical and lay welfare staff is not so much a luxury as a necessity. A report recently issued by the Industrial Health Research Board [2] points out that careful and accurate records of absences are the only means of checking the effects of new processes or changes in working conditions. Where the causes of sickness are collected and grouped it is found that much of the women's excess rate is due to "nervous" conditions—which can be greatly reduced by tactful welfare work. A small proportion of the excess is due to "ailments of women," but disability due to the menstrual function has shrunk to negligible proportions, thanks to a recognition of the importance of cleanliness and exercise.

In comparing the sickness-rate and working capacity of men and women it is easy to forget how unequally the pressure of domestic duties falls on the two sexes. That great champion of the working woman, MARY MACARTHUR, used to relate the story of a friend who acted as forewoman in a factory in the last war. Talking to a man engaged on an exactly similar job, she complained of the increasing difficulty and expense of getting her greasy overalls washed. "But how lazy of you not to do them yourself at home," he protested, "my wife always does mine!" Leisure must be really leisure if it is to restore the worker's vigour unimpaired for the next day. Even when the workers are living at home substantial canteen meals should be provided and practical arrangements worked out for getting the laundry done. Small day-nurseries for children proved invaluable in the last war and greatly reduced short absences among married women. Today the introduction of a system of family allowances in industry would bring military and civilian conditions into line. The provision of hostels for mobile labour is a real boon and enables a sympathetic watch to be kept over the girls' health. In the last war thousands of girls at Gretna and Woolwich blossomed like the rose in spite of long hours and heavy work, and today their daughters should prove as capable of quitting themselves like men.

1. *Proc. R. Soc. Med.* 1938, **31**, 185.
2. Emergency Report, No. 1; see *Lancet*, April 13, 1940, p. 699.

SCOPE OF INTERNAL PNEUMONOLYSIS

THE popularity of internal pneumonolysis in the collapse treatment of pulmonary tuberculosis shows no sign of waning. On the contrary, within the last few months there have been four important contributions to the subject, two from this country and two from America. WOLLASTON [1] has reviewed 200 consecutive cases of adhesion cutting, and has compared them with pneumothorax cases discharged from the Royal National Hospital, Ventnor, in 1934, in none of which adhesiotomy was undertaken. He found that with internal pneumonolysis satisfactory collapse was obtained in 58·8 per cent. of the patients, whereas in 1934 the figure was only 25·8 per cent. SMART,[2] working in Chandler's clinic at the London Chest Hospital, gives a detailed analysis of 52 operations on 42 patients who had been followed up for two years; 27 of these now enjoy good health with a T.B. negative sputum, 7 are in fair health, 3 have relapsed or are very ill and 5 have died. The material was not composed

1. Wollaston, F. L. *Brit. J. Tuberc.* 1940, **34**, 13.
2. Smart, J. *Tubercle*, 1940, **21**, 81.

only of early, favourable cases but in some instances the adhesions were divided as a last resort. Both Wollaston and Smart had a low incidence of important complications which agrees with the published experience of Chandler and Brock. From across the Atlantic come descriptions of equally satisfactory results. JONES [3] bases his account on 163 operations, but a detailed analysis is lacking, while NEWTON [4] gives in full his experience of 182 operations on 146 patients with the gratifying figure of 87·6 per cent. clinical successes. The period of his follow-up, however, was short.

That the operation of internal pneumonolysis when performed by experts is an important adjuvant to the artificial pneumothorax goes unchallenged. These four publications, however, show a widening of the indications for the procedure based on a deeper appreciation of the principles underlying collapse therapy. It is not enough to compress the lung against the mediastinum; there must be a corresponding drop of the diseased apex from above downwards if firm healing is to follow. Referring to collapse of lung against the mediastinum Newton says "the lung thus collapsed may heal, but surely not with the same certainty as if concentric apicocaudal release were possible." Thus, "selectivity" and "concentricity" become the twin aims of relaxation therapy. It is but a short step from this premise to the belief that all adhesions attached to the affected part should be divided irrespective of the clinical state of the patient and the bacteriology of the sputum provided that their division can be executed with safety. It is evident that this step has been taken, for all of these workers agree that internal pneumonolysis should be attempted in every artificial pneumothorax in which adhesions are seen on the X-ray screen. To quote Wollaston, "a thoracoscopy should be performed in every case of partial pneumothorax," and Smart in echoing this sentiment adds "the operative risk of introducing a cannula and studying an adhesion is almost negligible." Not only must selective and concentric relaxation be attained but the operator strives for the *maximum* of both, because at present there is no means of measuring the degree of collapse necessary to ensure complete recovery in any particular patient. The disappearance of all symptoms and objective signs of toxæmia, the restoration of the weight to normal and a conversion of the sputum from positive to negative may all be ephemeral and none is a reliable index of absolute healing of the local lesion. For this reason the thoracoscopist plays for safety by leaving no thread intact, as does the physician when he maintains his pneumothorax for an arbitrary period of 4 or 5 years. The "greatest good for the greatest number" is all very well as an armchair generalisation, but medicine is a personal affair and from the point of view of the individual the passing of the "benign adhesion" may not prove to be altogether a good thing.

3. Jones, H. A. *Amer. Rev. Tuberc.* 1939, **40**, 722.
4. Newton, H. F. *Ibid*, 1940, **41**, 22.

IRRADIATION IN GAS GANGRENE

THE employment of X rays in the treatment of infections has not received as much attention in this country as in some others, notably America, and Dr. SEWELL'S letter on another page usefully draws attention to their value in gas gangrene. X rays were first used for this condition in 1928 at St. Catherine's Hospital, Omaha, by KELLY who had had a lot of experience with irradiation in other infections, and the patient made a remarkable and rapid recovery. KELLY next reported a series of 8 cases in 1933.[1] Since then a number of reports have appeared, and KELLY and DOWELL in their latest paper [2] refer to 132 cases treated with X rays with a mortality of 11·3 per cent. Cases have also been treated in this way in Australia by GODBY [3] and in this country by W. H. MOWAT, and the subject was discussed by D. W. SMITHERS [4] at the British Institute of Radiology on March 16. SMITHERS quoted three theories that have been put forward to explain the action of X rays: first, that the rays cause the tissues to throw out a protein which is resistant to the bacterial toxins; secondly, that small quantities of hydrogen peroxide produced by the rays inhibit bacterial growth; and thirdly, that the breakdown of the highly radiosensitive white blood-cells liberates antibodies in the infected area.

KELLY uses irradiation as a supplement to other measures—local minor surgery, antiseptics, gas-gangrene serum and tetanus antitoxin are all employed—but he claims that X rays reduce the mortality of the severe cases and save many a limb from amputation. He is strongly opposed to amputation as a therapeutic measure for gas-gangrene infection, and maintains that tissue should only be removed when the severity of the injury makes it imperative. He claims, in fact, that it is in the cases where amputation has hitherto been advised because of extensive infection that X rays have proved most successful. Where the trunk is involved the method also seems to be of value. Thus the 8 patients with trunk involvement in KELLY'S second series of 32 cases all survived, and SEWELL [5] points out that success has been attained in infections of the trunk where grossly involved tissue has not even been incised. Against KELLY'S successes where irradiation was supported by serum and other established aids must be set the 14 cases treated by COLEMAN and BENNETT [6] with X rays alone, of which 10 died. Furthermore, PAGE [7] points out that X rays do not hold out much hope in the fulminating case and are unnecessary where infection is strictly localised. Much work has still to be done before their true value can be estab-

1. Kelly, J. F. *Radiology*, 1933, **20**, 296.
2. Kelly and Dowell, D. A. *Ibid*, 1939, **32**, 675.
3. Godby, W. H. *Brit. med. J.* Jan. 20, 1940, p. 107.
4. *Lancet*, April 6, 1940, p. 646, and April 13, 1940, p. 724.
5. Sewell, R. L. *Surgery*, 1939, **6**, 221.
6. Coleman, E. P. and Bennett, D. A. *Amer. J. Surg.* 1939, **43**, 77.
7. Page, C. M. *Brit. med. J.* March 9, 1940, p. 411.

lished, and the results must clearly be judged not only by the survival-rate but also by the amount of mutilation necessary in overcoming the infection. GODBY is perhaps over-enthusiastic when he says that "X-ray therapy is the first line of attack in the treatment of gas-gangrene," but it may be that in severe cases early amputation and widespread drainage will give way to conservative surgery, designed merely to clear the wound of foreign matter and hopelessly damaged tissue, combined with chemotherapy and irradiation.

ANNOTATIONS

DIAGNOSIS OF DIPHTHERIA

TEACHERS, particularly of bacteriology, take great pains to impress on successive generations of students that the diagnosis of diphtheria must be primarily clinical and that the laboratory must be used secondarily to confirm or refute the clinical diagnosis. But succeeding generations of practitioners insist on putting the onus of diagnosis on the bacteriologist who must therefore be prepared to give a quick and accurate report on the nose or throat swab submitted to him. For rapid diagnosis certain laboratories still use the direct smear, but its pitfalls are many and except in the case of membrane, diagnosis from a direct smear is not encouraged by most bacteriologists. Other quick methods, such as the use of a swab covered with a pellicle of serum or the application of a solution of tellurite to the swab or the throat, have not proved reliable so that the Loeffler slope is still the mainstay in most laboratories for the early diagnosis of diphtheria. Within the past decade or two, however, it has become apparent that a proportion of cases of manifest faucial diphtheria are being missed when Loeffler's medium is used alone, while nasal diphtheria, the suspected carrier, and the increasing number of atypical cases have rendered a more careful bacteriological diagnosis, using biochemical or virulence tests or both, essential. To achieve this, growth on a larger and more accessible surface and on a medium which will inhibit other bacteria is desirable, and so the Petri plate and telluric acid or one of its salts, introduced by Conradi and Troch in 1912, came into use. The next step was the differentiation by McLeod and his colleagues of the diphtheria bacillus into three main biological types, and the recognition of these by their colonial appearance on a selective blood-tellurite medium. Since then various modifications of these original media have been introduced, and many of the larger laboratories doing public-health bacteriology have adopted a plate-tellurite-blood (or serum)-agar method, usually in conjunction with the Loeffler slope which still has the advantages of early selective growth of *C. diphtheriæ* and a small proportion of positive cultures where the tellurite media are negative. Comparison of the Loeffler slope with any of the plate methods invariably shows the superiority of the latter, as workers in Leeds have again shown in this issue, but it must be remembered that growth in the one is on a slope and in the other on the larger and more accessible surface of a plate. That the diphtheria bacillus has in fact often grown on the Loeffler slope when it cannot be found in a film made from the culture is readily demonstrated by plating the growth on such a medium as that of Allison and Ayling, which is particularly suited to the isolation of *C. diphtheriæ* from a mixed culture. The disadvantages of all media containing tellurite are the delayed growth of the diphtheria bacillus and the great difficulty of microscopic diagnosis from them. Practice in the recognition of colonial types may enable the experienced worker to give a diagnosis in most cases in 24 hours but in smaller laboratories suspected colonies will have to be subcultured on a tellurite-free serum medium. To obviate delay and minimise the need for virulence tests Maslen[1] has devised a rapid method for testing the biochemical reactions of such colonies picked from the tellurite medium, but even so 48 hours must elapse before a diagnosis can be given. Thus we come back to the point that the bacteriologist must be the handmaiden—now a more efficient handmaiden—to the clinician in the diagnosis and treatment of diphtheria.

EYE INJURIES FROM MUSTARD GAS

MUSTARD GAS was one of the later horrors of the last war—the first cases were reported in July, 1917—but in its first six months it accounted for 40,000 casualties in our army in France. In this war we have had no opportunity of testing the newer remedies, and let us hope we never shall, but knowledge is accumulating from the experimental side. Livingston and Walker[2] have been carrying out some experiments in rabbits. They instilled a small drop of mustard oil into the rabbits' eyes so that it fell directly on the cornea. A few of the rabbits showed some degree of natural resistance to mustard, but in most of them the reaction was immediate, rapid and intense, and within five minutes considerable damage was done to the surface of the cornea. Irrigation with a lotion containing bleach in a strength of 1 in 400 caused corneal haziness and cannot therefore be recommended, but a 2 per cent. solution of sodium bicarbonate had some merit. Attention has to be directed towards combating the spread of keratitis produced by the chemical irritation of the highly toxic by-products of corneal disintegration and secondary bacterial infection. Mustard is said to combine with the free amine groups of the protein molecule to form a stable toxic substance, and since no reagent is known which will penetrate the cornea with equal speed and not harm the eye the only approach which offers hope of amelioration is through the blood-stream. Livingston and Walker injected a saturated solution of ascorbic acid intravenously into their rabbits twenty minutes before applying mustard, and followed this up with six daily injections of 500 mg. of ascorbic acid. This apparently had some effect in arresting the spread of keratitis and lid inflammation and in preventing secondary infection. Cod-liver oil by mouth seems also to help the regeneration of corneal tissues and to check the spread of keratitis. Between the fifth and eighth days there is massive desquamation and the micro-organisms of secondary infection may appear in the discharge. At this stage Livingston and Walker say that Merthiolate (Lilly) 1 in 10,000 with a diffusing factor cleans up infection and aids resolution. A mydriatic is essential in the severer cases. Phillips[3] prefers 0·5 per cent. hyoscine to atropine. Warthin and Weller[4] say that dichloramine-T 0·5 per cent. in chlorinated medicinal paraffin is of value in dealing

1. Maslen, L. G. C., *Lab. J.* January, 1939.
2. Livingston, P. C. and Walker, H. M. *Brit. J. Ophthal.* February, 1940, p. 67.
3. Phillips, T. *Proc. R. Soc. Med.* February, 1940, p. 225.
4. Warthin, A. S. and Weller, C. V. *J. Lab. clin. Med.* 1918, **4**, 785.

with secondary infection, but this substance is only stable for three days. Methylene-blue 0·5 per cent. and scarlet red 3 per cent., recommended by French eye surgeons, is under trial. The recovery of the ocular tissues also depends on the general condition of the patient and is retarded by pulmonary complications.

The likelihood of neurasthenia developing in these cases must be borne in mind, and Stallard[5] has pointed out the psychological importance of arranging for first-aid treatment of gassed troops in the forward areas. The swollen lids, conjunctival discharge and adherence of the lid margins make men think they are permanently blinded, but panic may be checked by early reassurance and treatment. Provision should therefore be made for carrying out irrigations with lukewarm 2 per cent. sodium bicarbonate and for instilling 1 per cent. Pantocain or its equivalent as a local anæsthetic and cod-liver oil drops. Tinted eye-shades should also be supplied. For irrigations in the field Stallard has designed an improvised lotion container which is made out of a petrol can and four bullet cases, by which one team of orderlies could treat 80 men in an hour.

POST-MORTEM CHANGES IN BONE-MARROW

BONE-MARROW cells are known to be very liable to post-mortem change, and smears of marrow made at autopsy have long been abandoned on account of the poorness of nuclear detail. Jeanneret[6] has now described the time-table of these changes. Several sternal punctures were performed on each of 58 cases during life and at various times after death, one always being within the first hour after death. He found that only up to one hour after death was the cellular detail comparable to that of cells taken during life, though staining even then was rather inferior. The most sensitive cells were neutrophil polymorphs, cells in mitosis, and platelets, all of which showed serious changes within three hours, the two latter having often entirely disappeared. Normoblasts show changes from the first; the cytoplasm becomes steadily less basophilic and the number of pyknotic cells increases. These changes are interesting because, according to the results of sternal biopsy, the common erythroblast of normal marrow is a basophilic or polychromatic normoblast with a healthy nucleus, whereas marrow sections from autopsies give the impression that orthochromatic normoblasts with pyknotic nuclei are most common. Evidently this difference is due to post-mortem changes. Neutrophil myelocytes and myeloblasts are somewhat more resistant: lymphocytes and plasma cells show changes after about fifteen hours and eosinophils remain remarkably resistant. Thus within twenty-four hours the relative proportions of the marrow cells have changed considerably. Neutrophil polymorphs may be entirely absent, other varieties are relatively increased, and unclassifiable cells are more numerous. Local temperature had little effect on the rate of change, but the presence of sepsis accelerated it so that serious changes were appearing after an hour and a half. In 10 of the cases smears were made from expressed rib marrow at the same time as the sternal punctures. They showed the same post-mortem changes at the same rates, but in earlier smears it was noticed that there were more immature cells and stroma cells and more fat in the rib marrow than in the sternal-puncture marrow. This Jeanneret attributes to the fact that since sternal puncture is a suction method it tends to gather fewer of the immature and stroma cells which are less easily dislodged. The practical significance of this work by Jeanneret and others he quotes is that, unless we can get an autopsy within three hours after death, the bone-marrow we study, by whatever method, will present a distorted picture, and arguments about fine detail are futile. Reports of diminution of neutrophil polymorphs in post-mortem marrow, as in industrial poisoning by benzol, are particularly suspect. The differences between costal marrow and sternal-puncture smears warn us that the latter presents a picture which is on the whole too mature, and that emphasis should not be laid on small changes in the relative proportions of the various cells. So long as this is remembered sternal puncture remains of great value for the study of bone-marrow.

5. Stallard, H. B. *Brit. J. Ophthal.* February, 1940, p. 53.
6. Jeanneret, H. *Schweiz. med. Wschr.* April 20, 1940, p. 351.

"FROSTED" FOODS

PRESERVATION of food by drying, pickling and developing alcohol in it was intended to stretch a glut over a time of famine. Cold storage, a much later development, enables food to be transported great distances. A combination of gas and cold storage preserves the original flavour. Were it not for wars, nationalism and acquisitiveness the solution of adequate feeding of the world would be within our grasp. Everybody, given the will, could probably be well and reasonably fed. Meanwhile food preservation has been conquering new fields. From the earliest times people have hankered after fruits out of season and today we want them not only out of season but with their full natural taste. The "quick-freeze" method has made considerable advances in that direction, and even in small towns we are now offered soft berry fruits and tender vegetables such as green peas in the depth of winter with all or most of the freshness of the natural product pulled six months earlier. These fruits and vegetables have been quickly frozen at a temperature of anything from zero to 40° below zero, and kept at zero till sold on the retail market. Any attempt to obviate the disadvantages of natural events rouses hostility (e.g., the use of chloroform in parturition) and every method of preserving food has been met with suspicion. Some of this has been justified in the event (dried vegetables) and some not entirely (canned fruits and vegetables). So naturally it is asked whether these quick-frozen foods have any or all of their dietetic, as distinct from their gastronomic values, preserved. The answer rather triumphantly is "yes, nearly all." Dr. Mary Swarz Rose, professor of dietetics at Teacher's College, University of Columbia, in a report to the American Medical Association,[1] says there is no reason why the vitamin C of frosted fruits and vegetables when cooked should be less than those of fresh ones when cooked. To retain its maximum vitamin content the fruit or vegetable should pass straight from field to processing plant, it would be thoroughly "blanched" to destroy the ascorbic acid oxidase, and rapidly frozen, and finally cooked without defrosting. The vitamin-A values of such foods remain unchanged over many months. Vitamin-B_1 values may be decreased unless the blanching process is short. There is little loss of riboflavin. Such considerations show that frosted fruits and vegetables are a welcome addition to the dietitian's sources of foods in the off-season especially in providing vitamin A (green vegetables, apricots, tomatoes) and vitamin C (summer fruits and most green vegetables). Fruits and vegetables contain little vitamin B_1 in any case, so that the small loss of that vitamin in frosted foods is insignificant.

1. *J. Amer. med. Ass.* April 6, 1940, p. 1356.

REFRESHMENT FOR CANADIANS

IT was a happy idea of the honorary staff at Middlesex Hospital to offer hospitality to medical officers from Canada. The plan has been for a group of twenty or so of these visitors to come for a day as a sort of refresher course. The programme begins with a lecture or demonstration at 12 noon. Then lunch is provided out of a fund which the staff have subscribed. In the afternoon several attractive programmes are arranged to suit different interests and the proceedings close, more or less, with tea in the nurses home. It is rumoured that a swimming display by the nurses after tea gets a bigger audience than any of the lectures or more scientific demonstrations and this is all to the good, for the social side of these visits to town has been looked after from the start. Not only do the staff at Middlesex Hospital thus meet colleagues from overseas in friendly contact but even the visitors prove at first to be strangers to each other or old acquaintances who have not met since college days. Several old friendships have thus been renewed on these "Canadian visits." The Earl of Athlone, governor-general-designate of Canada, a former chairman of the board of the hospital, paid a visit last week to take tea with a group of medical officers from his new realm. He was welcomed by Major Astor, M.P., the present chairman of the hospital and members of the board and honorary staff and he then made the acquaintance of the guests who were headed by Colonel R. M. Luton and Colonel J. A. Linton. Now that the Middlesex staff's "good turn" is no longer under a bushel it may be possible for other hospitals to adopt the medical officers of other contingents. Swept out of their ordinary work, transported thousands of miles from home and then facing the inevitable period of "lounging about," these guests from overseas welcome the chance of a chat and a cup of tea with their colleagues in Britain.

EVACUATION IN THEORY AND PRACTICE

THE Health Committee of the League of Nations, at its first war-time meeting in November, considered that a pooling of experience in the medical problems of evacuation might be valuable to member-states. Consequently a meeting of the emergency subcommittee of the Health Committee, together with experts from nine countries, was held at Geneva on March 4–7 to consider medico-social questions arising out of the movements of civil populations. To synthesise the medical experience of countries such as France, Great Britain and Finland, which had experienced evacuation under very different aspects, into a form which would be valuable to countries making plans for future evacuation was clearly a most difficult task, and the report which was made available to governments as a result of the meeting was necessarily in general terms. Obviously such factors as the time available, the classes evacuated and the conditions under which evacuation is occurring will greatly modify the measures necessary for the protection of health. Compared with a bomb, a louse or an acarus looks very small indeed. The report, therefore, sets out the measures to be considered in an evacuation under the most favourable conditions, and it is perhaps chiefly valuable in bringing home to administrators that there are important medical aspects in evacuation problems—a fact not fully realised in other countries besides our own. Even the agenda of the Geneva meeting caused a stir in the evacuation department of one country, which had previously overlooked the necessity for calling its medical advisers into consultation. The real value of such a meeting is, of course, in the opportunity for the round-table exchange of views and experiences and not in the necessarily somewhat platitudinous document which emerges from them. The general points brought out in the discussions were the necessity for previous detailed consultation between "opposite numbers" in the evacuation and reception areas; the need for educating both evacuees and hosts in the conditions of life which they will find; the value of retaining with the transferred population the health and social personnel previously in charge of them; and the necessity for propaganda and education of the women in the tasks which they will have to perform. In Switzerland, for example, demonstrations are given by women to women showing exactly what it is best to take and the best method of carrying it in the event of a sudden evacuation being necessary. It is hoped in this way to avoid the pathetic spectacle, noted in every description of refugees, of the retention of the canary and the aspidistra at the expense of bread or boots. On the more purely medical aspects there was general agreement that the expected epidemics, notably diphtheria, from the dispersal of an immune population among non-immunes had not developed. Standards of rural hygiene had been raised in many places through the influx of town dwellers demanding certain amenities, and the opportunity had been taken in many countries to re-enforce or introduce voluntary or compulsory measures of vaccination against smallpox, diphtheria and typhoid. In Holland it seems that the most successful method in practice of obtaining consent to voluntary inoculation was through house to house visiting with the distribution of leaflets. The conference realised that the social and medical aspects of evacuation were intermingled, and the advisory committee on social questions has decided to hold another meeting to consider the social problems involved. In face of the tragic events which have since happened in Norway, it may well be thought that the more academic aspects of evacuation are less important than the work of the practical sanitarian who, faced like Moses with a disorganised flight into the wilderness, must enforce sanitary discipline and get back to the elementary principles of pure water, food and shelter.

RICE IN INDIA

ALTHOUGH the relationship between the consumption of highly milled rice and beri-beri was firmly established 25 years ago by the work of Eijkman, Grijns, Braddon, Fraser and Stanton, Vedder and others, yet the League of Nations inter-governmental conference of far-eastern countries on rural hygiene held in Java in 1937 agreed that the habit of using highly milled rather than under-milled or home-pounded rice was spreading, and that the economic and other factors underlying this regrettable tendency had not been fully studied in any country. A comprehensive investigation has now been undertaken by the Coonoor Laboratories of the Indian Research Fund Association.[1] Rice is the most important staple crop in India, and in Eastern Madras, Orissa, Bengal and Assam make up more than three-quarters of the total food crops. Diet surveys have shown that the poor rice-eater's diet is roughly similar in composition in various parts of India. In addition to his staple cereal he consumes only small quantities of pulses, vegetables and meat, while his intake of milk is negligible. The nutritive value of the diet must therefore depend to a large extent on its main

1. Aykroyd, R. A., Krishnan, B. G., Passmore, R. and Sundararajan, A. R. The rice problem in India, Indian Medical Research Memoirs No. 32, Calcutta, 1940.

ingredient. Milled rice is poorer than under-milled rice in most important constituents, though the loss in nutritive value in milling is lessened if rice is "parboiled," a process in which unhusked rice is steamed or boiled after soaking and pounded or milled afterwards. Caste, however, prohibits the general employment of parboiled rice which is considered to be polluted, and its use is restricted to the lowest classes. The washing and cooking of any kind of rice reduce its content of vitamin B_1 and nicotinic-acid by about 50 per cent., but it is only in those areas where the population live on rice which has been milled raw that beri-beri is endemic. Animal and human experiments and the incidence of deficiency diseases show that typical rice diets are also deficient in vitamin A, calcium, and various factors in the vitamin-B_2 complex. In the Madras Presidency the rice mill is said to be spreading rapidly, and has come to be regarded as a labour-saving convenience. Small-holders, too, are often forced by poverty to dispose of their paddy (unhusked rice) to merchants, and when home-pounded rice is put on the market it is dearer than machine-milled rice. Dr. Aykroyd and his colleagues suggest that agricultural research should aim at the production of high-yielding strains of rice and that any tendency to abandon parboiled rice in favour of raw should be checked by education. The milling of raw rice beyond a certain degree might also be prohibited by legislation, a minimum content of 1·5 μg. of vitamin B_1 per gramme of milled rice being laid down as standard, corresponding roughly to that of once-polished rice. They recommend that public-health propaganda should include instruction about the losses in vitamin content occurring during the washing and cooking of rice, and it should be made widely known that in cooking the minimum amount of water should be used and that the cooking water should be drunk and not discarded. Finally they point out that the poor rice-eater's diet can be improved by the partial substitution of rice by millet.

A TEST OF FITNESS

SOME light is thrown on the methods which are being used to tackle the effort syndrome in the French army by Lian,[1] who reaffirms his faith in the diagnostic test he used during the last war. In this test the patient is made to "mark time" at the rate of two steps a second for a minute, care being taken to insist that the hips are fully flexed at each step. The pulse-rate is then counted for a quarter of a minute immediately after the test and again every minute until it has regained its original level, the patient meanwhile remaining standing. The result is satisfactory if the pulse-rate has returned to normal by the beginning of the second or third minute, and definitely unsatisfactory if the pulse-rate rises to 160 per minute or does not regain its resting level in six minutes. If the response is satisfactory the man is fit for active service. If it is definitely unsatisfactory the man is kept under observation, in hospital or elsewhere, and the test is repeated several times. If a satisfactory response is finally obtained the man is passed for active service, but if he gives a consistently unsatisfactory one he is given light duty or transferred to civilian life. The intermediate group do not need to be returned to civilian life, only slight modifications of active-service requirements being necessary. Lian says that the toe-touching test is not severe enough for military purposes and that other tests, such as mounting steps or running a prescribed distance, require more space than is often available for medical examinations. He does not touch on the knotty problem of treatment and is content with a survey of the various views on ætiology. The experience gained in the last war, as well as in civilian practice since then, suggests that no test yet evolved will guarantee absolute accuracy in the selection of those victims of this syndrome who are fit for active service, though Lian claims to have obtained valuable information from his.

1. Lian, C. *Pr. méd.* April 16, 1940, p. 385.

AN AYLESBURY BROADSIDE

IN a world increasingly dedicated to destruction medicine stands out ever more brightly as an agent of preservation and healing. During the last war the physiologist left his laboratory for the canteen and laid the foundation of a science of nutrition which saved nations from starvation and inanition. Now we know how children can be fed even in time of scarcity; the food is there and needs only to be distributed. But this seemingly simple distribution is already missing its mark and will break down more and more completely as the war presses on the households in which children are being brought up. There is no surer method of securing that every child shall be properly fed than the allocation of a sum of money week by week for that express purpose. The need and the method of meeting it are so obvious to the doctor as to require no advocate, but there are many thoughtful people to whom the notion of a national system of family allowances is still unfamiliar. To these is addressed the pamphlet noticed in our advertisement columns, which is to be published on May 20, and we ask our medical readers with confidence to bring the broadside to the notice of their non-medical friends.

The next session of the General Medical Council will open on Tuesday, May 28, at 2 P.M., when the president, Mr. H. L. EASON, will deliver an address.

Dr. JOHN RITCHIE has been reappointed for a further five years member for Scotland of the General Medical Council.

Sir Weldon Dalrymple-Champneys has been appointed deputy chief medical officer (acting) of the Ministry of Health from Aug. 1 in succession to Dr. Thomas Carnwath who is retiring, and Dr. Dorothy Taylor has been appointed senior medical officer (acting) in succession to Dr. Isabella Cameron who is also retiring. Dr. E. L. Sturdee will succeed Sir Weldon as principal regional medical officer (acting).

At a meeting of the Royal Sanitary Institute at Plymouth on Saturday, May 25, at 10 A.M. Dr. W. N. M. Mason, deputy medical officer of health for Plymouth, will open a discussion on food-poisoning.

On the outbreak of war a number of experienced almoners were temporarily discharged, but as time went on it was seen that war brought more work and not less for the almoner to do. Hospitals in which work had been curtailed opened again at least partially, and new hospitals in the E.M.S. found it necessary to appoint almoners, so that by the end of 1939, according to the annual report of the Institute of Hospital Almoners, thirty-two new departments, as against twenty-eight in 1938, had been opened. The war has also increased the scope of the almoner's work. In one London hospital the almoner has been made responsible for all admissions; in another an inquiry bureau has been set up. The institute which was evacuated to Oxford for the first months of the war has now returned to London and may once more be addressed at Tavistock House (North), Tavistock Square, W.C.1.

PREVENTION AND TREATMENT OF WOUND INFECTION

V

CHEMOTHERAPY OF INFECTED WOUNDS

BY G. A. H. BUTTLE, M.R.C.S.

MAJOR, R.A.M.C., ARMY BLOOD-TRANSFUSION SERVICE

CHEMOTHERAPY has shown itself of immense value in certain medical conditions but has still to prove its worth in infected wounds in war. Many derivatives of sulphanilamide have been tried in infectious conditions, but only one is useful where sulphanilamide is not. This is M. & B. 693 (sulphapyridine), described by Whitby [1] in 1938. It is active in pneumococcal conditions, whereas the other sulphanilamide derivatives are not. It is also as active as sulphanilamide in streptococcal and more active in staphylococcal infections. Recently another compound, sulphathiazole, has been introduced, which may prove superior to sulphapyridine in staphylococcal infection; it is active also in streptococcal and probably only slightly inferior to sulphapyridine in pneumococcal disease.

MODE OF ACTION

These drugs, unlike ordinary antiseptics, have no great destructive effect on bacteria in vitro, but they delay the growth of streptococci and certain other organisms in culture media, and the effect is still more obvious in shed blood. Their value in vivo depends on the fact that, although they inhibit bacterial growth, they produce little or no harmful effect on the phagocytic cells of the host; further, they are not rapidly eliminated or destroyed in the body but are readily diffusible throughout all tissues. The growth of the infecting organism is thus inhibited, and the defensive cells of the host can defeat the infection.

In vitro some bacteria are more sensitive than others to these drugs; the bacteria which are more sensitive to the usual antiseptics are affected more than those which are less sensitive. Gonococci and meningococci are influenced more than streptococci and staphylococci, and the typhoid-coli group are still less affected. In the case of all organisms the effect of the drugs is much more obvious when the organisms are in a poor medium than when they are in a good medium for supporting growth, a fact which is of great importance when we consider the action of the drugs in vivo. In clinical work the effectiveness of the drugs in various conditions appears to be determined more by the situation of the infecting organisms than by their sensitiveness to the drug. If bacteria are situated in a relatively poor medium for supporting growth—e.g., urine or blood—the drugs are very effective; if, on the other hand, they are situated in a good medium—e.g., a collection of pus or other products of tissue breakdown with inadequate drainage—the drugs have little effect. Thus cystitis and pyelitis due to *Bacterium coli* are rapidly cured, but gonococcal cases with gland abscesses do not respond to treatment, although in vitro, in broth medium, the gonococcus is extremely sensitive to the drug and *B. coli* almost insensitive. This limitation of the effectiveness of the drugs is probably very important in infected surgical cases, where there is often a large collection of pus or other products of tissue breakdown. Although the drugs are not a substitute for surgical removal of damaged tissue or drainage of infected parts, they should prevent the spread of infection to other tissues and, by inhibiting the multiplication of bacteria, assist the defensive cells in the undamaged part of the wound area to clear up the infection.

1. Whitby, L. E. H. *Lancet*, 1938, **1**, 1210.

TREATMENT OF INFECTED WOUNDS

Late deaths due to wounds are almost invariably caused by infection. The severity of the infection depends on the nature of the country where the fighting takes place; it will be more serious where there is highly cultivated soil, as in France or in Flanders, than in sandy uncultivated regions like South Africa or Egypt or in snow-covered ground, as in Finland. During the last war Fleming and Porteus [2] found that the commonest infecting agent, the *Streptococcus hæmolyticus*, could be recovered from 15 per cent. of wounds at casualty clearing stations, and from 90 per cent. of wounds a week after admission to a base hospital. The incidence of gas gangrene varied from 10 per cent. of wounds in the early part of 1915 to 1 per cent. in the latter part of 1918. Clearly, any measure which would prevent or cure streptococcal infection and gas gangrene would greatly reduce mortality.

PROPHYLAXIS

The sulphanilamide drugs ought to be more useful in prevention than in cure; they would have more chance of being effective against invading bacteria if given immediately after wounding, before the accumulation of necrotic material which so rapidly follows infection of a wound. It is therefore most important that the drugs should be given as soon as possible after wounding. They may be administered both by mouth and locally into the wound; local applications have not yet been used extensively, but they may be very useful in preventing infection. Because of the severity of the shock commonly associated with wounds, prophylactic treatment by mouth may have to be delayed until the patient has recovered from shock. Local applications of sulphanilamide to wounds will not involve the same risks in this respect, because little of the drug reaches the bloodstream during the first three or four hours. Although the effect of the drugs on men who are seriously shocked is not known, large doses reduce the body temperature of animals and it may be that they would aggravate the shocked patient's condition; on the other hand, clinical experience may show that these precautions are unnecessary (Long has found that the drugs do not increase the shock). This prophylactic treatment would not be a substitute for the surgical cleaning of the injured parts; damaged tissues round the wound should be removed as soon as the patient's condition permitted it.

Treatment by mouth.—The doses of sulphanilamide necessary for administration by mouth in the prophylaxis of wound infection can only be ascertained from clinical experience, which is not yet available; probably a small dosage by mouth will suffice when the drug is also applied locally to the wound. Fuller and James [3] have suggested that 1·5 g. should be given by mouth as soon as possible after wounding, and that this should be followed by 0·5 g. four-hourly, starting two hours after the initial dose. After the first twenty-four hours 1 g. given eight-hourly is just as efficient as the four-hourly dosage. These recommendations are based on obtaining a minimal concentration of 2 mg. per 100 c.cm. of blood as early as possible, and in three subjects receiving the recommended dosage the concentrations of sulphanilamide in the blood varied from 2·2 to 5·5 mg. per 100 c.cm. This concentration is slightly less than is commonly used for severe blood infections, but it will probably suffice when combined with local treatment of the wound. Treatment for a week will be wanted in most cases, and sometimes it will be necessary to continue for two weeks, according to the condition of the wound. The patient should be carefully watched after the end of the course of treatment, because if the

2. Fleming, A. and Porteus, A. B. *Ibid*, 1919, **2**, 49.
3. Fuller, A. T. and James, G. V. *Ibid*, March 16, 1940, p. 487.

bacteria are not all destroyed the infection may flare up again two days after the drugs have been stopped. The suggested dosage must be considered as purely experimental. If infection develops in spite of the treatment, and the drugs do not appear much more toxic in these severely shocked patients than in others, the dosage might be increased; if on the other hand the drugs appear dangerous in badly shocked patients it may have to be reduced. In America a dosage of about double that suggested by Fuller and James has been used as a prophylactic in some civilian injuries, and, according to Perrin Long (personal communication), it has been found that the drugs do not increase the shock. The shock associated with war wounds will, however, be often more serious than that found in civilian cases.

Sulphanilamide is suggested for this treatment because, unlike sulphapyridine it does not cause vomiting, which might be a grave danger to soldiers already suffering from shock and dehydration; it is also cheaper and more easily obtainable. Sulphanilamide is as effective as sulphapyridine against streptococci and against *Clostridium welchii*, two organisms which cause most of the dangerous infections of wounds. It is not so effective as sulphapyridine against vibrion septique; but this organism was present in only 10–28 per cent. of cases of gas gangrene. Nor is it so effective against the staphylococcus, which is very common in infected wounds but does not usually cause generalised or dangerous infections. When there is a compound fracture, however, there is an increased risk of staphylococcal osteomyelitis, and in these cases sulphapyridine might be superior to sulphanilamide. Sulphathiazole, a compound described by McKee et al.,[4] may prove even better; it does not cause vomiting, is slightly superior to sulphapyridine in staphylococcal infections, and is also good against streptococci; its action against *Cl. welchii*, however, has not yet been determined. A rough indication of the comparative usefulness of the various drugs in different infections is given in the accompanying table.

ACTIVITY OF DRUGS AGAINST VARIOUS ORGANISMS

Infecting organism		Sulphanilamide	Sulphapyridine*	Sulphathiazole
	Streptococcus ..	+++	+++	+++
Gas gangrene	*Cl. welchii*	+++	+++	—
Gas gangrene	Vibrion septique	±	+	—
Gas gangrene	*Cl. œdematiens* ..	0	0	—
	Staphylococcus ..	±	+	++
	Meningococcus and gonococcus ..	+++	++++	—
	Pneumococcus ..	±	+++	++

++++ Very good and rapid effect.
+++ Good and reliable effect.
++ Good, but less than above.
+ Slight effect; drug useful possibly as adjunct to other treatment.
± Very slight effect. 0 No effect.
— No data yet available.
* Sulphapyridine causes vomiting; the other drugs do not.

Treatment by injection.—If the patient cannot swallow, the drugs must be given by parenteral injection; for this purpose sulphapyridine soluble is usually employed. It should be given either by deep intramuscular injection or intravenously, in which event it must be diluted in three to five volumes of saline, to prevent unpleasant reactions due to the alkalinity of the solution. Injections of quantities up to 3 c.cm. of the 33 per cent. solution should be given every four hours; if a larger dose is given in one injection, there is a risk of toxic reactions. A suggestion has been made that sulphanilamide should be added to stored blood for use by advanced units. This procedure might cause a more rapid deterioration of the blood than would otherwise take place, although it would be convenient for the initial treatment of patients who could not swallow.

Treatment by local application has recently been investigated. Jensen and others [5] inserted 5–15 g. of sulphanilamide into forty-one wounds associated with compound fractures, and healing by first intention took place in every case except two, where the fractures were recompounded. Before the use of sulphanilamide the infection-rate was 27 per cent. Evidence was also produced that this form of local treatment will deal even with staphylococcal infection of experimental fractures. Estimations of the sulphanilamide in the blood of two patients receiving this local treatment showed that the concentration was maximal in eighteen hours and returned to zero in sixty hours. Nitti [6] has found that sulphanilamide, 1 g. per kg. of body-weight, placed in wounds artificially infected with streptococci, kept rabbits alive for eight or nine days longer than the infected but untreated controls, which died in one or two days. Large doses of sulphanilamide placed in the wounds of animals did not damage the tissues. This work suggests that the local application of sulphanilamide will be a useful adjunct to treatment by mouth but will probably not supersede it entirely. The drug in the vicinity of the wound will all be eliminated in two or three days; hence after this period it will be necessary to rely on the oral route. The most satisfactory line of treatment seems to be to apply sulphanilamide powder 5–15 g. to the wound locally and to combine this with the course of treatment by mouth already suggested. When local application is used, however, it will probably be unnecessary to start the treatment by mouth until forty-eight hours after the local application to the wound. During this time a sufficient concentration of the drug in the blood to prevent dissemination of the infection will be maintained by the sulphanilamide reaching the blood from the wound. When the wound area is large, the rate of absorption of the drug may be so rapid as to produce temporary toxic symptoms, but these are unlikely to cause permanent harm if the total dose in one application does not exceed 15 g.

This local treatment will probably only be effective in the absence of suppuration; if pus is present, all local measures should be directed to the promotion of free drainage. The drug will probably be more effective after the surgical toilet of the wound, after which the wound should if possible be closed; but it seems that a preliminary dressing, applied as soon after wounding as possible, would also be useful, especially against gas gangrene, which sometimes develops extremely rapidly after wounding. Such a dressing, in the form of a pack containing 5 g. of sulphanilamide, might well be supplied with the first-aid equipment carried by each man. Further experimental work is clearly wanted. It seems, however, that no antiseptic other than sulphonamides should be applied to open wounds. Iodine and phenol will do more damage to the phagocytes of the tissues than to the infecting organisms. A 0·1 per cent. solution of proflavine and a 0·1 per cent. solution of 2:7 diaminoacridine have been shown by Falconer [7] to be without harmful effect on brain tissue, but no experiments on infected animals have yet been recorded. It is uncertain whether the dyes would penetrate into the tissue and retain their antiseptic properties sufficiently to deal with a wound infected some time previously.

CURE

Infected wounds as a rule contain many different organisms besides foreign matter—soil, clothing, pieces of shell—surrounded by contused tissue.

4. McKee, C. M., Rake, G., Greep, R. O. and Van Dyke, H. B. *Proc. Soc. Exp. Biol., N.Y.* 1939, **42**, 417.
5. Jensen, N. K., Johnsrund, L. W. and Nelson, M. C. *Surgery, St. Louis*, 1939, **6**, 1.
6. Nitti, F. *Bull. Acad. Méd. Paris*, 1939, **122**, 432.
7. Falconer, M. *Brit. med. J.* April 13, 1940, p. 631.

Excision of the contused area will be necessary in all cases, and treatment with sulphanilamide will be started at the same time, as already indicated. If, in spite of this prophylactic treatment, signs of spreading infection or of gas gangrene appear, it will be best to substitute sulphapyridine for sulphanilamide and to increase the dosage to 8–9 g. by mouth daily. If there are signs of gas gangrene, vibrion septique or *Clostridium œdematiens* may be present; therefore an injection of the combined antitoxins against these organisms should be given. It is uncertain whether antitoxin against *Cl. welchii* type A will be useful or not. Different strains of this organism probably produce slightly different toxins, so that antitoxin will be more effective in some cases than in others. Bohlman[8] and Kennedy[9] found that chemotherapy alone was sufficient, and Long[10] considers that the use of sulphanilamide alone eliminates the necessity for amputation in gas gangrene except when the condition is far advanced owing to its not having been diagnosed early enough. The number of cases of gas gangrene treated with sulphanilamide so far is small, and some strains of the organism produce much more toxin than others. If gas gangrene appears in a case which has already been treated with sulphanilamide prophylactically, it will be advisable to give a mixture of *Cl. welchii* antitoxin with the antitoxins against vibrion septique and *Cl. œdematiens*. If the more toxigenic types of *Cl. welchii* (types B, C, and D described since the last war) are found in gas gangrene, antitoxic sera against these will also prove useful; so far, these types have not been described in man, although they are often seen in animals and are commonly found in soil. There is no clinical evidence about the chemotherapy of infection with vibrion septique and *Cl. œdematiens*. Experiments of Stephenson and Ross,[11] however, show that vibrion-septique infection is not easily treated with sulphanilamide, although sulphapyridine is somewhat better; the best results are obtained by giving sulphapyridine as soon after infection as possible and following this up with treatment with the specific antiserum. *Cl. œdematiens* has been used in only a few experiments, but these indicate thas it is insusceptible to both sulphanilamide and sulphapyridine; the only treatment for this infection is, therefore, with the specific antiserum. The incidence of these three anaerobes in gas gangrene in the last war was variously given as *Cl. welchii*, 45–82 per cent., *Cl. œdematiens*, 10–48 per cent., and vibrion septique, 10–28 per cent. Although *Cl. welchii* is the commonest, the two other anaerobes must not be neglected.

Cl. tetani has been used in several chemotherapeutic experiments. It seems that the sulphonamides have only a slight effect on infections due to this organism. Mayer[12] has described a slight effect of sulphanilamide in infected animals; he also finds some influence on the neutralisation of tetanus toxin. Probably chemotherapy will not be very effective in tetanus, except by limiting the growth of the concomitant infecting organisms and thus preventing the local anaerobic conditions necessary for the development of *Cl. tetani*.

Wounds which are already suppurating when they are first seen should probably be treated with larger doses of drug than those recommended for prophylaxis. Sulphanilamide will probably be as effective as sulphapyridine, except perhaps where compound fractures increase the risk of staphylococcal osteomyelitis and for infection with vibrion septique, which is comparatively rare. The maximal dosage of sulphanilamide which it will be possible to use will probably be 4 g. followed by 1 g. four-hourly, which dose is gradually reduced to 0·5 g. four-hourly at the end of a week. The simultaneous administration of vitamins A, B complex, C, and D also assists the healing of infections; there are as yet no animal experiments to confirm this finding, but the simultaneous administration of these vitamins to increase the general resistance, in combination with the chemotherapy, should be tried. The best local treatment of a suppurating wound will probably be with sodium sulphate and hypertonic saline, which will assist the evacuation of the necrotic material. It is doubtful whether irrigation with a solution of sulphanilamide drugs will be of any value, it is more likely that processes which assist in the physical removal of the necrotic material will be better than any effort to destroy the bacteria without removal of this dead matter.

8. Bohlman, H. R. *J. Amer. med. Ass.* 1937, **109**, 254
9. Kennedy, W. C. *Illinois med. J.* 1938, **73**, 260.
10. Long, P. H. Clinical and Experimental Use of Sulphanilamide, Sulphapyridine and Allied Compounds, New York, 1939.
11. Stephenson, D. and Ross, H. E. *Brit. med. J.* March 23, 1940, p. 471.
12. Mayer, R. L. *C.R. Soc. Biol. Paris*, 1939, **130**, 1560, 1562.

TOXIC SYMPTOMS

No chemotherapeutic agent has yet been described which is entirely harmless to the host if used in excess. The sulphonamides are no exception. In small doses they are usually well tolerated, and the only common toxic effect is slight malaise, which is usually worse with sulphapyridine than with sulphanilamide and is often accompanied by nausea and vomiting. Extreme cases of hypersensitivity have been described but are very rare. If the drugs are given for ten days or longer there is a risk of leucopenia, and in a small number of cases of agranulocytosis. This risk constitutes the only real danger from the drugs. Slight degrees of leucopenia are relatively common and harmless, but a large fall in the number of polymorphs constitutes a warning that the drugs should be discontinued. For this reason white-cell counts should be done at intervals of two to three days or a blood smear may be made, and, if the differential count shows the polymorphs to be less than half, the drugs should be discontinued. Apart from the cell count there is no warning of the onset of agranulocytosis except a deterioration of general condition, continued pyrexia, and severe prostration. As soon as there is an indication of the onset of agranulocytosis the drugs are discontinued and fluids are given to eliminate the drugs as soon as possible. If the condition is already established and the red cells are below 60 per cent., transfusions are indicated. Injections of Pentnucleotide have also been used to induce a leucocytosis.

Although agranulocytosis is the only real danger in sulphanilamide therapy, there are several minor toxic manifestations. The so-called cyanosis or blueness of the skin is common but is not an indication for withholding the drug. A rise of temperature during treatment ("drug fever") is not uncommon and is sometimes difficult to distinguish from a recrudescence of the infection. It subsides, however, on withholding the drug. Nausea and vomiting are very common with sulphapyridine; they are sometimes so bad that it is impossible to tell how much drug is retained, and in these cases it is necessary to give the sodium salt of the drug in solution by injection. Other toxic manifestations are dermatitis (usually morbilliform); minor nervous disturbances, such as headache, lassitude, depression (more pronounced with sulphapyridine), paræsthesia, transient peripheral neuritis; and acute hæmolytic anæmia. The anæmia, unlike agranulocytosis, develops early in the treatment; it is rare, and no deaths have been recorded. Besides these effects, sulphapyridine sometimes produces hæmaturia, owing to the deposition of concretions of the acetyl form of the drug in the renal tubules.

CONCLUSION

Chemotherapy will in all probability reduce considerably the incidence of serious infections following wounds. Sulphanilamide, sulphapyridine, and sulphathiazole all have a rapid effect on streptococci; sulphapyridine has proved the most successful of the three in meningococcal, gonococcal, and pneumococcal infections, and sulphathiazole is possibly the most

(*Continued at foot of opposite page*)

SPECIAL ARTICLES

TUBERCULOSIS IN THE SILICA-RISK INDUSTRIES *

BY CHAS. L. SUTHERLAND, M.D. Glasg., D.P.H.
CHIEF MEDICAL OFFICER, SILICOSIS AND ASBESTOSIS MEDICAL BOARD

"Almost every mechanical employment, it is said, has a tendency to injure some one or other of the bodily organs of the artisan. Grinders of cutlery die of consumption; weavers are stunted in their growth; smiths become bleareyed."

WHEN in 1834 Lord Macaulay made this remark in the introduction to his essay on William Pitt dust was known to be a source of pulmonary disease in many trades, and protective measures against the inhalation of dust had already been attempted. Later in the century, when consumption or phthisis was recognised to be an infectious disease and the tubercle bacillus known to be its cause, the existence of the second factor in the production of such diseases as miner's phthisis was gradually appreciated. Early in the twentieth century Haldane's work on tin miners led him to use a high death-rate from pulmonary tuberculosis at the later age-groups as the touchstone of the existence of a specific dust hazard. This specific dust hazard was shown to be the dust of silica—i.e., the dust arising from crushed flint, sandstone, ganister and the like. Moreover the disease produced had a distinct tendency to end as pulmonary tuberculosis.

The general conception of silicosis today is that of a disease in which two factors may be associated: (1) silica dust, which is the essential factor at least for the initiation of the silicotic process, and may be the only factor present throughout the disease; (2) infection by the tubercle bacillus, which is responsible in many cases for the development of the disease to a disabling degree and its termination in death. The great body of opinion in Great Britain now agrees that if the inhalation of dust could be prevented the tuberculosis risk in dusty occupations would become that of the ordinary population. But this opinion is not universally held, and various views have been put forward as to the part played by tuberculosis, which after all is quite a common infection in all ways of life. There is a school of French pathologists, for example, who consider that silicosis is tuberculosis merely modified by dust inhalation. Watkins-Pitchford's opinion (1927) was that silicosis, from its appearance as a clinically detectable condition, is in the majority of instances already linked up with a latent element of tuberculous infection. Barnes of Sheffield in 1908, giving evidence at an inquiry into disease amongst cutlery grinders, maintained that tuberculosis was then the most important condition and the effect of dust of secondary importance.

In framing laws for the provision of compensation of workmen suffering from the disease, legislators have found the combination of a dust disease and an infection rather a problem. In the original scheme of compensation for silicosis in this country, the Refractories Industries (Silicosis) Scheme, 1919, compensation was made payable when the worker was disabled by silicosis accompanied by tuberculosis only if the silicosis was so far advanced as to make the worker specially liable to tuberculosis or was likely to accelerate materially the progress of the disease. The amount of compensation payable was proportionate to the effects of the silicosis and the certifying officer had to assess the proportion of disability due to silicosis apart from the tuberculosis. As the result of experience the scheme was amended in 1925 to put silicosis and silicosis accompanied by tuberculosis on the same footing as regards compensation. An even more curious enactment was that in Ontario where a man totally disabled by uncomplicated silicosis was compensated at 66⅔ per cent. of his wages when last employed. If he developed tuberculosis in addition his compensation was reduced to 50 per cent. on the theory that 10 per cent. of the population would develop tuberculosis regardless of the specific exposure to silica.

DEATHS CERTIFIED BY THE SILICOSIS MEDICAL BOARD DURING THE EIGHT YEARS 1932–39

Industry	Caused by silicosis	Caused by silicosis acc. by tuberculosis	Not caused by the disease*	Total
Refractories industries	15	33	19	67
Masons and sandstone quarrymen ..	142	274	137	553
Granite-masons ..	5	46	8	59
Pottery industry ..	106	150	51	307
Coal-mining ..	261	173	212	646
Metal-grinding industries	14	42	15	71
Sandblasters ..	11	22	3	36
Tin-miners	22	23	8	53
Hæmatite-miners ..	5	10	6	21
Other metalliferous miners	4	3	1	8
Miscellaneous industries	15	21	11	47
	600	797	471	1868

* The disease means silicosis or silicosis accompanied by tuberculosis.

EXPERIENCE OF THE SILICOSIS BOARD

The table gives the details of certificates issued by the Medical Board for Silicosis and Asbestosis in death claims during the eight years 1932 to 1939. Since these figures do not represent all the cases of deaths where silicosis was present or suspected during the eight years, they are of limited statistical value. It must be remembered, too, that the death cases coming to the board represent only a small proportion of the deaths in dusty industries. A great majority of workers in these industries die from natural causes, and though silicosis is often present it is definitely not the cause of death. In such cases no claim for compensation is made.

The 600 certificates of simple silicosis indicate that the medical board have accepted what King and Belt (1938) call the "silica specificity theory," which postulates that silica dust per se causes a disabling fibrosis of the lungs. In the 797 cases where death was certified to be due to silicosis accompanied by tuberculosis the diagnosis was made mostly on microscopic appearances. Since compensation is payable to the same extent whether silicosis or silicosis accompanied by tuberculosis is the cause of death, precise differentiation between the two conditions is not necessary for

* Read at a meeting of the Association of Industrial Medical Officers on April 19, 1940.

(*Continued from previous page*)

useful in staphylococcal infections. The drugs will be more effective in prophylaxis than in cure. Sulphanilamide should be given both by mouth and into the wound as soon as possible after wounding. The results obtained with sulphanilamide in cases of gas gangrene due to *Cl. welchii*, though few, have been so good that the extensive amputations commonly necessary in the last war for this condition may be largely avoided.

the purposes of the award of compensation. In many cases it would certainly need very elaborate methods to make sure that tuberculosis was not present, for the diagnosis of tuberculosis post mortem is, like the diagnosis clinically, not always easy. The expression "silicosis accompanied by tuberculosis" which is used in the Workmen's Compensation Act is useful in that it avoids all discussion as to whether the silicosis or the tuberculosis was present first.

HOW DOES INFECTION TAKE PLACE?

Twenty years ago the impression generally was that silicosis was a disease which suddenly showed itself as tuberculosis from the age of forty onwards. At that time it was not the appearance of tuberculosis that seemed surprising but its appearance so late in life. This delayed appearance was so striking that it gave rise to the idea that silica dust might have a protective effect against tuberculosis. That idea led to the question: When and how does the infection with tuberculosis take place?

The opinion of Barnes already referred to was that tuberculosis was common among cutlery grinders because of the ease of infection. A tuberculous workman would spit into the water-trough in which his wheel turned. The tubercle bacillus was thus sprayed into the atmosphere along with the dust. No doubt other conditions were present which favoured the spread of tuberculosis. Such conditions are in fact common to many dusty industries—a confined space, poor light, a humid warm atmosphere with little ventilation. Humid air holds organisms and dust particles in suspension. Stillness of the atmosphere keeps the particles floating in the air (Angus and Stewart 1937). It has been shown by experiment that water-saturated and dusty air carries away from the surface of a culture many more organisms than does dry air (Douglas and Hill 1921). The warmth and lack of sunlight aid the survival of the bacillus.

Accordingly it seems that a young worker coming into such an environment is exposed to the possibility of infection with tuberculosis. Yet the Registrar-General's returns do not indicate an undue death-rate from tuberculosis in this group; in fact the low tuberculosis mortality of the young cutlery grinder was quoted as indicating that the high mortality-rate in later age-groups is not due to a poor class of recruit. Barnes, however, thought that careful investigation might have shown an increase of tuberculosis in the young grinder, and that the curve of tuberculosis mortality in grinders might have shown a rise in the younger age-groups as well as the recognised rise in the later age-groups. No such investigation was carried out till much later when Meiklejohn (1930) in a study of the deaths from tuberculosis in Sheffield grinders from 1918–27 made graphs which showed that there was a primary peak and a secondary peak of deaths when plotted according to age. The primary peak occurs at or before the 40–45 age-group; graphs for individual years showed it quite definitely in the 20–25 group. Graphs from controls show a regular curve and this control curve coincides at its peak with the primary peak of grinders. Meiklejohn interprets the primary peak as indicating the natural group of tuberculosis cases, that is, men who would have died of tuberculosis irrespective of the occupation they chose to follow. The period over which these figures were taken was, however, one in which grinding conditions greatly improved and their effect on the younger workers might not then have been so definite.

That new workers in a silica-risk industry may become affected by tuberculosis has been demonstrated in Wales and in South Africa. A "saddleback" curve of age mortality from tuberculosis has been described at one time as evident in the lead-mining districts of Cardiganshire and the quarry districts of Pembrokeshire and Anglesea (Cummins 1933). On the Witwatersrand there is a high incidence of acute pulmonary tuberculosis in natives in the mines in their first year of service. The tuberculosis-rate, however, falls sharply in the next few years to rise later on, when the factor of silicosis plays a large part. This high incidence in the first year is related to what is described as a lesser degree of inherent natural immunity than is found in the European or the absence of a comparable degree of previously acquired immunity (Irvine 1938). In comparing the reaction of the Yorkshireman, the Welshman and the South African native exposed to similar influences this inherent immunity must be borne in mind.

The reason given for the prevalence of tuberculosis amongst the new boys in the mines is not that they become infected but that pre-existing lesions become reactivated. The mine boy comes from the kraals where tuberculosis is endemic, and since he reacts to tuberculin he has already been infected although on examination he appears healthy. Reactivation and not exogenous infection may be the explanation in the South African native, but not necessarily in workers in other parts of the world. Sayers (1937) favours an exogenous source for the early tuberculosis in silica-risk industries in America and the reason he gives for this opinion is interesting. Nurses under thirty in the tuberculosis wards of United States government hospitals had in the past developed so much more tuberculosis than those over thirty, that only women over thirty were now employed. He assumed that the infections were exogenous and derived from the patients, and by analogy that the silica risk would increase the natural susceptibility of the younger workers to exogenous infection.

SILICO-TUBERCULOSIS

The new entrant to a silica-risk occupation, then, may take his tuberculosis with him, he may become infected on entering, or may escape either temporarily or permanently. If the natural resistance is high, as it is in the Sheffield grinder, the lesion heals up, if low, as in the mine boys, the disease progresses rapidly. The grinder or mine boy who has a quiescent lesion must presumably have had some inherent resistance to tuberculosis, but the healing of the lesion may lead, as Cummins (1929) points out, to a gradual loss of the immunity produced by the invasion. They may therefore in time become as liable to a subsequent infection as those who have escaped at first.

The tuberculous lesion may persist, however, and become the starting point of a condition described in America as silico-tuberculosis and in South Africa as tuberculo-silicosis. This, according to Brumfiel and Gardner (1937), is neither silicosis nor tuberculosis, nor is it a simple summation of the two, but is a distinct disease entity. The characters of this entity are its chronicity, that it appears in the later decades, and that tubercle bacilli are difficult or impossible to demonstrate till late in its course. By postulating this separate entity it is possible to explain the origin and the late termination of the disease. But whether we accept this conception of silico-tuberculosis or not we must in many cases assume the presence of a latent tuberculosis. Fisher (1933) accepts this as the explanation of why in a large body of men exposed to similar conditions only a small proportion develop a disabling fibrosis. It is claimed in America that the incidence of adult tuberculous infection among males under thirty in a tuberculosis-ridden community, in the presence of a silica hazard, is sufficient to account for all the subsequent deaths due to silicosis accompanied by tuberculosis (Cummins 1935).

REACTIVATION OR EXOGENOUS INFECTION

There are certain occupations which force us to favour reactivation as the explanation. It is not likely that sand-blasters, who are subjected to an intense exposure to silica dust, can receive an exogenous infection at work, when working by themselves. In younger men it seems as if the early tuberculous lesion becomes reactivated, and often goes on not to simple tuberculosis but to a massive silicosis with comparatively slight if very active tuberculosis. The same may be true of some of the stonemen in

quarries when working away from their fellows. In both these instances the cases often do not fall into the silico-tuberculosis group but seem to form a distinct class. However, there seems to be no doubt that many cases are not the result of reactivation but of exogenous infections. It is perhaps not wise to attempt, as Gardner (1937) does, to distinguish between exogenous infection and reactivation by noting the position of the possible commencement of the tuberculous process. A tuberculous lesion arising at the apex of the lung in a case of silicosis may as often be an infection from without as one beginning lower in the lung.

The difficulty of proving an exogenous source of tuberculosis lies in the fact that in the human "experiments" of which we are spectators, in contrast to animal experiment, we cannot arrange the conditions beforehand. One has to try to get information after the experiment is concluded and most of the victims have gone. Often where a series of cases of silicosis accompanied by tuberculosis is discovered at a workplace one feels that there has been an undiscovered common source of infection. The suspicion that one workman may be the direct cause of other cases occurring within a short space of time is expressed by Thomas (1937) in his description of acute cases in lead-miners.

Another illustration of this was observed in a small metalliferous mine which had been working for about thirty years without any undue mortality. The first case met was one of acute miliary tuberculosis of the lungs in a miner aged twenty-nine; in this man silicosis could not be proved, but within a year there were seven cases of severe silicosis. Four of these died and three had tuberculosis. Of the other three, two had tubercle bacilli in the sputum. There was a suggestion that could not be confirmed that a miner who had started work at this pit some few years before had been an open cases of tuberculosis. Further, the fact that six were under forty gives strong support to the probability of such an outside source of infection, and makes it likely that the cases were not the result of reactivation of quiescent lesions.

Some say that the virulence of the tubercle bacillus in silicotic cases is increased, others that it is diminished. Kettle (1933) came to the conclusion that the virulence is not increased. Collis (1915), on the other hand, relying on the old statement that contacts with infected silicotics do not contract tuberculosis, suggested that the virulence is diminished. But this alleged paucity of positive contacts is very doubtful and several observers have expressed disbelief. Actually there seems to be no evidence that the tubercle bacillus of silicotics differs in any way from that infecting the population round about (Cummings 1935).

EFFECT OF DIFFERENT DUSTS

The deaths certified by the Silicosis Medical Board as due to silicosis accompanied by tuberculosis (797) were more numerous than those certified as due to simple silicosis (600). In the coal-mining industry the reverse was the case. Explanations given for this are that the dust involved has not been that of silica or that the action of silica is modified by the coal or anthracite dust. It has also been shown that coal has an action on the toxins of the tubercle bacillus (Cummins 1934). However, that tuberculosis is more prevalent in South Wales colliers than is commonly believed seems highly probable, although pathologists have so far not given their support to the opinion. Williams (1933), Sen (1937) and Davies (1940) have at different times expressed this opinion. Amor (1940) maintains that the cricket-ball mass, so common in South Wales anthracite miners, has a tuberculous basis. According to him many of these cases give a history of contact with open cases of tuberculosis, and this particular group appear toxic and occasionally may even have tubercle bacilli in the sputum. Pathologically he finds a similarity between the lungs without definite tuberculosis and those proved to be tuberculous by finding Koch's bacillus in them; he also notes small cavities in such lungs which suggest tuberculosis. Amor also observes that these cricket-ball masses develop more rapidly than typical nodular silicosis. If we accept the view that these coal-mining cases are more often tuberculous than the certificates show, the points put forward by Amor imply a fairly recent exogenous infection, probably from the home.

In the granite-masons, as shown in the table, the number of deaths certified as due to silicosis accompanied by tuberculosis is nine times the number of deaths from silicosis. Furthermore in cases seen during life, especially in the Aberdeen granite-masons, it is rare to find the radiological picture found regularly in the gritstone-masons. Instead of definite nodulation a fluffy or feathery marking of the lung fields is usually found. Similar observations have been made in America where it is considered that granite contains some constituent which inhibits the action of silica. There is apparently a condition of latent silicosis which is ended by tuberculous infection or reactivation of an old lesion.

The cases in which death was certified as not due to the disease include cases which had definite exposure but did not develop silicosis. This natural resistance may be due to many conditions such as the excellence of the nasal filter which prevents dust reaching the lungs. But sometimes dust may be present in the lungs without producing fibrosis; such cases are described by King and Belt. No doubt also the presence of dust without fibrosis is the basis of what is known as latent silicosis, in which workers may leave a silica risk apparently healthy but return after some years with well-developed silicosis. Watkins-Pitchford (1927) thought that such cases might sometimes owe their temporary freedom from the disease to their resistance to tuberculosis. Analysis of the ash of lungs usually gives results for silica content corresponding to the amount of fibrosis present, but Stewart (1940) finds "that lungs which show notable silicosis not infrequently contain at the time they are examined smaller amounts of silica than many apparently non-silicotic organs." It may be that for some reason the silica in latent silicosis is not readily soluble, or that there is present some inhibitory element as in granite.

Among the cases in which silicosis was not found were 52 of tuberculosis. Some of these had been employed in processes where the silica risk is slight but others had considerable exposure. On the Witwatersrand (Irvine 1938) the incidence of simple tuberculosis in white miners has never been excessive. Our figures probably indicate a similar slight incidence of simple tuberculosis in our workers, since claims are likely to be more numerous because of the presence of tuberculosis.

The relationship of asbestosis to tuberculosis does not appear to be of the same order as that of tuberculosis and silicosis. The medical board's figures for asbestosis are too small to be of help, but Dr. J. C. Bridge, H. M. senior medical inspector of factories, informs me that the number of deaths from asbestosis known to the Home Office Factory Department from 1933 to 1939 inclusive was 90, in 32 of which tuberculosis was present.

PREVENTION

The essential aim is to prevent the inhalation of dust. Since this is not easily achieved one must attack the infective factor by supervision of the worker. Anything tending to increase susceptibility to various infections in a general sense (Middleton 1936) such as poor ventilation, lack of vitamin A or D and so on must be remedied. Prophylactic inoculation has been suggested (Mavrogordato 1926) but has not been attempted in industrial workers.

The only practical measure of prevention that can be adopted at the moment is to try to prevent the tuberculous worker from entering the industry by an examination before he starts work, and to detect new cases by periodical examinations afterwards. The medical board carry out such examinations in the

sandstone industry and refractories industries, and also in certain processes in the pottery and asbestos industries. Recently examinations in dusty industries have been criticised on various grounds, of which the chief is the expense. Considering the difficulties and the complicated nature of the disease itself it is not easy to put forward figures or other direct proof of the value of these examinations, but without them all possibility of controlling the infection would be lost. The initial examinations by the medical board consist of a clinical and if necessary a radiological examination. The board are required to suspend the worker if evidence of present or past tuberculosis of any organ is found, or if he does not reach a certain prescribed standard of physique. This examination probably suffices to keep out a considerable proportion of susceptible individuals, but of course it may be criticised as incomplete. There are no tuberculin tests and all cases are not X rayed. Experience teaches, however, that the greatest defect is the fact that the most painstaking history, taken in the case of a workman at a factory, does not ensure that one gets an accurate family history of tuberculosis, and so one misses valuable information of contact with open cases.

There is considerable doubt of the value of tuberculin tests, and there is the contradictory evidence from South Africa and from Scandinavia (Topley and Wilson 1936). Tattersall (1940) sums up the position in this way, "Of youths entering the silica-risk industries at about 15 or 16 years old," he says, "about 40 per cent. will give a negative tuberculin reaction. On the other hand I should not regard the fact of a positive result as in any way sufficient to consider excluding such persons from the industries. In fact it might even be argued that those with a negative reaction were exposed to a greater risk than those with a positive, as they represent virgin soil which when damaged by silica might prove much more susceptible to the implantation of tubercle than those whose positive response indicating infection presumes some degree of immunity."

Periodical examinations are a means of detecting new cases both of silicosis and of tuberculosis, but they are also the only way of keeping under observation detected cases of silicosis who are allowed to continue at work. The more elaborate means of discovering when a latent form of tuberculosis becomes active, such as sedimentation tests and blood-counts are in practice difficult to carry out. It has been found that the working man objects to blood-examinations. Craw (1937), however, in a series of 50 hæmatite iron-ore miners, found blood changes when infection supervened.

SUMMARY

A new worker entering a silica-risk industry may have active tuberculosis on entering or have a quiescent lesion which becomes active later. He may become infected within a few years of starting work.

The infected worker may develop the condition known as silico-tuberculosis which usually becomes an open tuberculosis after a number of years. Such a case probably has only a short period during which he is infectious to other workmen as he then quickly becomes unfit for work. In certain occupations where exposure is intense, as in sand-blasting, a worker with a quiescent tuberculosis has this focus reactivated. In other industries the focus may remain quiescent for years but ultimately may become active after a simple silicosis has developed. A new worker with quiescent or open tuberculosis entering a silica-risk industry is a potential source of infection to simple silicotic cases; further, the development of silicosis in cases of latent silicosis will be precipitated by tuberculous infection.

The tubercle bacillus from cases of silicosis is not altered in virulence. The presence of other dusts may modify the relation of silica and the tubercle bacillus in the production of the disease, as in the granite and coal-mining industries.

Practicable measures of prevention are: elimination of the dust; improvement of general hygienic conditions; selection of workers entering the industries; and medical control of workers in the industries.

REFERENCES

Amor, A. J. (1940) Personal communication.
Angus, T. C. and Stewart, D. (1937) *J. indust. Hyg.* **19**, 58.
Barnes, A. E. (1908) *Brit. med. J.*, **2**, 483.
Brumfiel, D. M. and Gardner, L. U. (1937) *Amer. Rev. Tuberc.* **36**, 757.
Collis, E. L. (1915) Industrial Pneumoconioses, Milroy Lecture, London.
Craw, J. (1937) *Tubercle, Lond.* **19**, 8.
Cummings, D. E. (1935) *Nat. tuberc. Ass. Trans.* **31**, 148.
Cummins, S. L. (1929) *Brit. med. J.* **2**, 39.
— (1932) *Pub. S. Afr. Inst. med. Res.* No. 30.
— (1934) *Amer. Rev. Tuberc.* **29**, 17.
Davies, T. W. (1940) Welsh Nat. Mem. Ass. memorandum.
Douglas, S. R. and Hill, L. (1921) *J. industr. Hyg.* **3**, 206.
Fisher, S. W. (1933) Silicosis. London: Institution of Mining and Metallurgy, p. 156.
Gardner, L. U. (1937) *J. industr. Hyg.* **19**, 111.
Irvine, L. G. (1938) Rep. Miners' Phthisis Medical Bureau, Pretoria.
Kettle, E. H. (1933) Action of Harmful Dusts. London: Institution of Mining and Metallurgy, p. 143.
King, E. J. and Belt, T. H. (1938) *Physiol. Rev.* **18**, 329.
Mavrogordato, A. (1926) *Publ. S. Afr. Inst. med. Res.* No. 19.
Meiklejohn, A. (1930) M.D. Thesis, Glasgow University.
Middleton, E. L. (1936) *Tubercle, Lond.* **17**, 241.
Sayers, R. R. (1937) Third Symposium on Silicosis, Wausau, Wisconsin.
Sen, P. K. (1937) *J. industr. Hyg.* **19**, 225.
Stewart, M. J. (1940) presidential address to Leeds Medico-chirurgical Society.
Tattersall, N. (1940) Personal communication.
Thomas, R. W. (1937) *Lancet*, **2**, 1481.
Topley, W. W. C. and Wilson, G. S. (1936) Principles and Practice of Bacteriology and Immunity, London, p. 1045.
Watkins-Pitchford, W. (1927) *J. industr. Hyg.* **9**, 109.
Williams, E. (1933) Health of Old and Retired Coalminers in South Wales, Cardiff.

ARSENIC IN LARGE DOSES

(FROM OUR U.S.A. CORRESPONDENT)

Two hundred syphilologists and specialists in internal medicine gathered at Mount Sinai Hospital in New York City on April 12 to hear a report of the investigation that has been carried on there in the last six years into the massive-dose arsenotherapy of syphilis by the intravenous drip method. Some account of this work has already appeared.[1] [2]

In 1931 Dr. H. T. Hyman published his observations on "speed shock,"[3] and Dr. Louis Chargin suggested the application of the intravenous drip technique to the arsenotherapy of syphilis. Dr. George Baehr made available a male ward on his service at the Mount Sinai Hospital and 25 cases of early syphilis were treated by allowing neoarsphenamine to flow at the rate of 30 to 50 drops a minute for a period of ten to twelve hours daily on five consecutive days. In this way each patient received in five days as much arsenic as is usually given in three months. Of these 25 patients 19 were kept under observation for three years and 15 for more than five years. The symptoms disappeared promptly, spirochætes disappeared from the primary lesions within forty-eight hours, and with the exception of one questionable case all those followed are considered to be cured.

The work was continued in 1938 under the supervision of a committee representative of public health authorities, the American Social Hygiene Association, the universities of Columbia and Cornell and the Mount Sinai Hospital. A new series of 86 cases was treated, making 111 in all to be treated with neoarsphenamine, but the 111th died from hæmorrhagic encephalitis. Tzanck[4] using massive arsenotherapy in France also experienced two fatalities. Although the American investigators consider the work of their

1. Hyman, H. T., Chargin, L., Rice, J. L. and Leifer, W. *J. Amer. med. Ass.* 1939, **113**, 1208.
2. Baehr, G., Hyman, Chargin and Leifer, *Trans. Ass. Amer. Phys.* 1939, **54**, 25; *Amer. J. Syph.* 1939, **23**, 685.
3. Hirshfeld, S., Hyman and Wanger, J. J. *Arch. intern. Med.* 1931, **47**, 259.
4. Tzanck, A. *Bull. Soc. franç. Derm. Syph.* 1938, **45**, 587.

French colleague to be "reckless and poorly controlled," his experience, together with their own, decided them to discontinue the use of arsphenamine and to substitute that of Mapharsen (arsenoxide). A series of 256 patients so treated was reported for the first time at this meeting. Although it is too early to make any estimate of the ultimate success of the treatment, a comparison of the toxicology of the neoarsphenamine and mapharsen series was possible. In the latter there were 3 patients who developed cerebral symptoms. In 2 cases they were transitory and the patients recovered without treatment. The third case developed convulsions on the seventh day after the beginning of treatment and went into stupor. He recovered in five days. This last case is considered to have been one of hæmorrhagic encephalitis. It was the only important toxic manifestation in the series. Polyneuritis which had been a troublesome complication with neoarsphenamine was reduced to negligible importance in the mapharsen series.

The technique at present employed was described by Dr. William Leifer.

The apparatus employed in the intravenous drip is packed and autoclaved in a special container, devised by Dr. Joseph Turner, the director of the Mount Sinai Hospital. Each set consists of a gravity flask and two lengths of translucent rubber tubing connected by a Murphy drip. The drugs are dissolved in a solution of triple-distilled water containing 5 per cent. dextrose. At the present time, four doses of the drug in the diluent are given without intermission each day so that each patient receives 240 mg. of mapharsen in 2400 c.cm. of 5 per cent. glucose solution. The slow rate of flow is approximately 3 c.cm. a minute. Ordinarily, the drip is set up about 8 A.M. and the full dose has been injected by the end of ten to twelve hours. At the end of this period the needle is withdrawn, treatment being discontinued during the night and resumed the next morning. This procedure is carried out daily for five consecutive days until a total of 1200 mg. of the drug has been administered in 12,000 c.cm. of diluent, containing 600 g. of dextrose. The total arsenic content is approximately 360 mg. The choice of the vein is important. Throughout the recent work the site of election for the insertion of the needle has been a vein on the forearm between the elbow and the wrist. This permits free movement of the elbow and no splint is required. The patient may assist in feeding and nursing procedures and there is less danger of dislodging the needle from this site than at the bend of the elbow. The right and left arms are used alternately. Usually a vein can be used again after a rest of twenty-four hours. With this technique local disturbances are uncommon, and infiltrations have occurred in less than 0·5 per cent. of cases. The patients have gained a good deal of weight during treatment, but since they are all derived from the underprivileged class it is not easy to know how much of this is to be attributed to the comfort of a hospital bed and the liberal hospital diet.

Several speakers emphasised the incompleteness of this piece of research, not least the researchers themselves. Nothing is known of the possibilities of the new method in the treatment of late, latent and congenital syphilis or in the syphilis of pregnancy. The selection of the time-dose factor seems to have been arbitrary. Dr. Earle Moore of Johns Hopkins entered a plea for wider experiment, including animal experiment, to determine the optimum concentration of arsenic in the blood and the appropriate time interval through which it should be maintained. The incidence of hæmorrhagic encephalitis had been considerably higher, he said, than in the experience at Johns Hopkins where 30,000 patients have been treated with only 2 cases of encephalitis resulting.

Dr. Walter Clarke foresaw grave danger from premature publicity. Newspaper stories might give rise to pressure which would compel doctors to adopt this system before the research can be completed. Dr. John H. Stokes thought that some doctors could keep in touch with their private patients perhaps even better than can the clinics and that these might share in the investigation. None of the speakers explained how in this land of liberty a doctor could be restrained from adopting the new technique if he believed it to be in the interest of his patient. The question of cost was also discussed. Dr. Theodore Rosenthal, for the committee, stated that the treatment had cost per case $61 for medical and nursing care and $21 for hospitalisation. This is less than the estimate of the New York state department of health of $100 for the treatment of an early case by the present methods, and the cost of the new method has been higher than it will be if adopted as a routine. It seems that this five-day treatment does not entirely remove the danger of infectious relapse but this is at least no greater than under the present form of treatment. Dr. John L. Rice, commissioner of health of New York city, pointed out the importance to his department of a method which renders patients non-infectious during the single week while their behaviour is under control in a hospital.

Panel and Contract Practice

Payment of Private Fees

THE Oxford city insurance committee have been dealing with an unusual case. An evacuee who was sent to the outskirts of the city became ill about a fortnight after her arrival. The services of a non-insurance doctor were obtained and in due course he submitted his account, which the insured person sent to the insurance committee with a request that they should pay it, but the Minister of Health declined to give his consent to payment out of the committee's funds. According to a newspaper report, a member of the insurance committee pointed out at their meeting that there was no resident insurance practitioner in the district concerned and that it was emergency treatment which was required. The committee adopted his suggestion that these facts should be brought to the notice of the Minister, who should be asked to reconsider his decision. At first sight the decision seems somewhat harsh, but it must be borne in mind that insured persons have certain responsibilities, one of which is to apply for treatment to their insurance practitioner. For years insurance committees have been exhorting insured persons not to wait until they are ill before taking their card to a doctor who lives or has a branch surgery in their neighbourhood. The woman in this case had failed to select an insurance doctor in the vicinity of her new address and this was clearly the cause of the whole trouble. It may be that treatment was urgently necessary, and being unaware of the address of the nearest insurance doctor she called in a private practitioner. Any refund of fees could, of course, only be made as a matter of grace, but in such cases payment is sometimes made for the first consultation, the view being that for subsequent attention there is nothing to prevent the insured person from sending his or her medical card to an insurance practitioner with a request for acceptance and a visit.

Reinstatement

The Ministry of Health have asked insurance committees to make arrangements for insured persons discharged from the Forces to be reinstated on the

lists of their pre-war doctors if they return to the same district. If the doctor concerned was away on national service when the insured person returned and was a participant in the scheme for the protection of practices the insured person would still be reinstated on the absentee doctor's list but would be entitled to treatment from another doctor under the scheme. Similarly, in the case of insured persons who leave home to serve in other branches of national service, or as evacuees, it has been suggested that where the insurance committee learns of the insured person's return before he applies to a doctor for acceptance the committee should inform him that he will be reinstated on his former doctor's list unless he tells the committee within a month that he prefers to be free to choose another doctor. No doubt most insurance committees will do what they can in this connexion, but it should be remembered that it is as a rule only when an insured person, having lost his medical card, applies to his original insurance committee for a new one that his return home becomes known before he secures acceptance.

PUBLIC HEALTH

An Epidemic of Pneumococcal Meningitis

THE pneumococcus, although world-wide in distribution, fortunately possesses only a fairly low degree of infectivity. Where it has caused local outbreaks circumstances have favoured the organism, as in overcrowded camps and so on, and the usual infections produced have been in the respiratory tract, accesssory nasal sinuses or middle ears. Other tissues of the body are susceptible in varying degree. Henderson [1] recorded 11 cases of severe ulcerative pharyngitis due to the pneumococcus which developed at a time when pneumonia and influenza were epidemic but without evidence of direct contact or case to case infection. Pneumococcal meningitis secondary to pneumococcal septicæmia is more frequent but up to now the disease has appeared only in sporadic form. Wilkinson,[2] however, has now described an outbreak of pneumococcal meningitis in the infectious diseases hospital at Hong-Kong.

The first patient, a woman of thirty, was admitted to a small ground-floor ward on Dec. 30 and died 24 hours later. The diagnosis of pneumococcal meningitis was not in doubt but unfortunately, in view of subsequent events, the organism was not typed. On Jan. 1 three patients in an adjacent ward who were convalescent from meningococcal meningitis became ill within a few hours of each other with what turned out to be pneumococcal meningitis and 2 days later four other patients were similarly affected. There was complete structural separation between this ward and the one in which the primary pneumococcal meningitis case had been treated but the nursing and other staff was common to both. It must be pointed out too that the bed spacing in this and other wards is given as 6 ft. or more as against a minimum of 12 ft. recommended for fever hospitals in this country. All seven patients died, in five cases from a type II and in the remainder from a group IV infection. Subsequently, during the first half of January, pneumococcal meningitis appeared as a secondary infection in other meningococcal meningitis wards and six further patients were attacked. To these should almost certainly be added two bacteriologically unconfirmed but otherwise typical cases of meningococcal meningitis who also developed pneumococcal meningitis in convalescence. This series of eight cases again had a 100 per cent. mortality, the incidence of pneumococcal types being: type II, 6 cases; group IV, 1 case; not typed, 1 case. Coincident with this outbreak primary cases of pneumococcal meningitis were being admitted but their precise distribution in the wards is not always given. Where it is given the sequence of events strongly suggests a case to case infection. Thus a patient convalescent from a presumed attack of meningococcal meningitis was being nursed alone in a small ward into which one of the primary pneumococcal cases was admitted on Jan. 10. On Jan. 13 the convalescent patient developed a rapidly fatal attack of pneumococcal meningitis, and, in both cases, the organism was a type II one. If, as seems reasonable, this can be regarded as a direct case to case infection the incubation period is shown to be short, certainly not more than 3 days. It would be difficult to explain all the infections on this basis, particularly the early explosive outbreak, because at least two types of organisms were apparently involved and the type of pneumococcus in the possible primary infecting cases is not always known. The possibility of direct droplet spray infection from case to case or via the intermediary of carriers, however, can certainly not be excluded. Staff carriers, as far as can be judged by throat swabs taken after the epidemic had begun, were not an important factor. Much more difficult to explain is the almost complete breakdown of the patients' resistance. Only meningococcal meningitis cases were attacked but it may be assumed that they were most heavily exposed if, indeed, other patients were exposed at all. But convalescent meningococcal meningitis cases must surely have been exposed to the pneumococcus on countless occasions in the past without mishap. A possible additional factor here was that, with one exception, patients affected by pneumococcal meningitis were still being given Streptocide at the time of infection, and this sometimes in doses of 4 grammes daily and at a period up to four weeks after their original admission to hospital with meningococcal meningitis. Prolonged dosage clearly did not prevent the onset of pneumococcal meningitis. It is questionable indeed whether the drug may not actually have interfered with the patients' resistance to the secondary invader. Probably the most important factor was the pneumococcus itself. This may be an example of an unusual invasive strain with a particular predilection for the central nervous system, a view supported to some extent by the post-mortem findings where evidence of involvement of any other system was most unobtrusive or entirely absent.

Wilkinson is not impressed with the action of either streptocide or sulphapyridine, which is not surprising since all the primary as well as the secondary cases of pneumococcal meningitis died. Unfortunately supplies of sulphapyridine did not become available in the colony until Jan. 7. Thereafter three primary and four secondary cases were treated with the drug but, with one exception, not till 4–6 days after the onset and usually after long preliminary dosage with streptocide, so that the strictures on sulphapyridine do not seem quite justified.

1. Henderson, R. G. *Lancet*, 1934, **1**, 615.
2. Wilkinson, P. B. *Caduceus, Hong-Kong*, May, 1939, p. 95.

Points from Annual Reports

Dr. Charles Porter retired from the position of M.O.H. of *St. Marylebone* after presenting his thirtieth annual report, that for 1938. During his

term of office the metropolitan borough has changed mainly by the encroachment of the shopping on the professional residential area. In the census of 1931 commerce, finance, the learned professions and administration occupied 44 per cent. of males and 30 per cent. of females; domestic, hotel and catering work 18 per cent. of males and 54 per cent. of females. The population is therefore unusual, but its age-distribution is not far from normal for the comparability factor is 0·99. Such a population has a low birth-rate (8·84 in 1938) an average death-rate (11·1 in 1938) and a high illegitimacy rate (12 per cent.). The infantile death-rate last year was 47 for legitimates and 155 for illegitimates. The death-table shows the very high cancer-rate of 2000 per million population and the low tuberculosis-rate of 350 per million. The former might be expected from the composition of the population, but the latter appears low in view of the numbers of young women employed as domestic servants and shop assistants. Most of the latter will not be residents of St. Marylebone. In 1938 a child-guidance clinic was established, with Dr. Grace Sherwood Calver in charge. Child-guidance clinics are usually a function of the school medical department, but the metropolitan boroughs have nothing to do with school-children, so the St. Marylebone clinic is solely for infants and toddlers. We are told that the mental symptoms of this age are practically all associated with assertive tendencies except for some anxiety symptoms after illnesses or operations. We can well believe that the preventive value of the work of this clinic is high; that the problems presented are not difficult to tackle; that the children themselves are easy to handle, but the adjustment of parents toward the children is far from easy.

Paddington metropolitan borough has a smaller area than St. Marylebone but a population 50 per cent. greater and a rateable value of almost exactly half. Its cancer death-rate in 1938 was however almost as high as that of St. Marylebone (1900 against 2000 per million) but its tuberculosis death-rate was distinctly higher 590 against 350). The borough has nine wards, of which three in the south differ markedly from the rest in their population and vital statistics. In 1938 in the three south wards the birth-rate averaged about 6 per 1000 population and the illegitimacy rate about 24 per cent. of total births. In the remaining six wards the birth-rate averaged about 15 and the illegitimacy rate about 13 per cent. There is less marked difference in the death-rates. The comparability factor for the whole borough is 0·99, the same as for St. Marylebone, but separate factors for the wards are not available. Dr. Geoffrey Oates, M.O.H. of Paddington, in his 1938 report gives a table of infant mortalities in special districts and streets. Of recent years infantile mortalities have tended to level themselves out though even today one locality may have four times the mortality of another over a short period. But in the baby-farming days parts of Paddington and some other metropolitan boroughs were notorious for their excessive infant mortalities. Another factor which caused many local districts of western London to have excessive infantile mortalities was the mews. Baby-farming has gone and the mews have been converted into garages, so these two causes of infant life destruction have disappeared. In 1938 there was only one case of poliomyelitis and one of polio-encephalitis notified and no case of encephalitis lethargica, though one death is attributed to the last.

Wandsworth is the largest of the metropolitan boroughs with an acreage of 9199 and a population in mid 1938 of 340,100. Though at the periphery of the county and having a density of but 38·8 persons per acre, its population is declining. In 1938 its birth rate was 11·92 (the decennial average) the crude death-rate 11·17, corrected rate 10·38. The natural increase, which is the difference between the birth-rate and the crude death-rate, was therefore 0·75 per 1000 and the fall in population due to emigration. Of the 3802 deaths which occurred in the borough in 1938, those due to heart disease numbered 971, to cancer 604 and to tuberculosis 199. The infantile mortality was 46, the lowest ever recorded. Of the 3802 deaths 2305 took place in institutions. Dr. F. G. Caley, M.O.H., in his annual report for 1938 gives a table of the age-incidence of the endemic infectious diseases which shows how this incidence has shifted since most of our textbooks on the subject were written. Of 3594 cases of measles, 2027 occurred in the 5–10 age-period and only 471 under the age of 3 years. Of 479 diphtheria, 197 occurred at 5–10 years, 64 at 10–15 and 88 above 15 years of age. Of 584 scarlet fever, 266 occurred at 5–10 years, and of 508 whooping-cough 209 occurred at 5–10 years. The brunt now falls on the infant and junior school ages. In measles and whooping-cough, which kill by respiratory complications, the forward shift of age of attack has led to an enormous reduction in fatality, but diphtheria which kills by toxæmia does not share in this reduced fatality. Diphtheria immunisation is making better progress in Wandsworth than in most of the London boroughs.

Between the 1931 census and mid 1938 the population of the borough of *Scunthorpe* increased from 33,761 to 42,000, raising the density from 4·01 to 5·2 persons per acre; but as the number of inhabited houses increased from 6866 to 11,688 the house-density fell from 4·6 to 3·6 per house. The most satisfactory feature in Dr. W. Hartston's annual report for 1938 was the fall in infantile mortality to the low rate of 33·9; the most interesting an account of an outbreak of epidemic pneumonia in a setting of clinical influenza reprinted from THE LANCET (1939, **2**, 1313). It is one of the last works in which the late Sir Patrick Laidlaw had a hand and is of great interest for throwing a dim light on the influenza-like outbreaks of 1938–39. Owing to the nature of its industries, atmospheric pollution is of great importance in Scunthorpe and in 1938 a special investigation into the state of the atmosphere was undertaken in conjunction with the department of scientific and industrial research of the Home Office. To this Dr. Hartston devotes a chapter, with charts. In the borough portion of Santon where there is a great steel works, tangible atmospheric pollution "has become sufficient to render that district unfit for normal healthy habitation." Cancer mortality in Scunthorpe in 1938 was exactly one death per 1000 population, the tuberculosis mortality 0·61 and the respiratory mortality 1·5 per 1000 population.

Infectious Disease in England and Wales

DURING THE WEEK ENDED APRIL 20, 1940

Notifications.—The following cases of infectious disease were notified during the week: Scarlet fever, 869; whooping-cough, 567; diphtheria, 712; enteric fever, 30; measles (excluding rubella), 4013; pneumonia (primary or influenzal), 815; puerperal pyrexia, 143; cerebrospinal fever, 390; poliomyelitis, 4; polio-encephalitis, 1; encephalitis lethargica, 6; dysentery, 44; ophthalmia neonatorum, 44. No case of smallpox, cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on April 19 was 951 made up of: scarlet fever, 137; diphtheria, 135; measles, 4; whooping-cough, 64; enteritis, 51; chicken-pox, 60; erysipelas, 32; mumps, 13; poliomyelitis, 1; dysentery, 7; cerebrospinal fever, 99; puerperal sepsis, 17; enteric fevers, 7; german measles, 139; meningitis, 2; other diseases (non-infectious), 46; not yet diagnosed 127.

Deaths.—In 126 great towns, including London, there was no death from smallpox, 1 (0) from enteric fever, 1 (0) from scarlet fever, 5 (0) from measles, 6 (0) from whooping-cough, 22 (1) from diphtheria 26 (6) from diarrhœa and enteritis under 2 years, and 56 (4) from influenza. The figures in parentheses are those for London itself.

Newcastle-on-Tyne reported the fatal case of enteric fever. There were 5 deaths from diphtheria at Plymouth.

LETTERS TO THE EDITOR

THE R.C.P. ON DIPHTHERIA AND RAW MILK

SIR,—I am directed by the president and fellows of the Royal College of Physicians of London to request you to give publicity to the following resolutions which were passed unanimously at a meeting of the college on April 26.

1. The Royal College of Physicians urges the Ministry of Health to encourage with all the authority at its command the immunisation against diphtheria of children in the age-group 1–15 by medical practitioners and by the staffs of all health authorities throughout the country, in view of the fact that there has been no abatement of diphtheria incidence or permanent reduction of mortality in England and Wales since the early years of the century. Further, in the opinion of the college, the cost of prophylactics required should not be allowed to interfere with or curtail the proper execution of schemes calculated to reduce so materially the incidence of diphtheria in the country. Where local outbreaks of diphtheria now occur the college recommends that advantage should be taken of the assistance of the expert staffs of the Emergency Laboratory Service to help to control by modern methods epidemics arising in those districts where such services are available.

2. The Royal College of Physicians recommends that the attention of the Ministry of Health should be drawn to the fact that large numbers of children who have been brought up on pasteurised milk in the towns are now receiving raw milk in reception areas to which they have been evacuated, and that the Ministry should be asked to do all in its power to secure the coöperation of the Milk Marketing Board and of the medical officers of health to arrange for supplies of pasteurised milk to be made available in all areas where there are sufficient numbers of children to demand it. Further, in the opinion of the college members of the medical profession might usefully advise parents and guardians of children of the risks of infection which attend the consumption of raw milk and of the value of pasteurisation or alternatively of boiling the milk in removing these risks.

I am, Sir, yours faithfully,

H. LETHEBY TIDY,
Registrar.

Pall Mall East, S.W.1.

TREATMENT OF GAS GANGRENE

SIR,—The increased attention being paid to gas gangrene in the British medical journals has prompted this account of the methods we now employ in this condition. In the past eight years there have been developed two conservative methods for the treatment of gas-gangrene infections as experienced in civil practice in the United States. Both have been attended by appreciable success when used individually and together. Neither expensive nor dependent on different technical methods, both have stood trial by many independent observers. While the number of reported cases is less than 150 there have been no unfavourable reports as yet. The case-mortality of the group is less than 10 per cent.

One method used widely now and introduced by Bohlman is sulphanilamide. The second method, which in this clinic has seemed to be the better of the two, is irradiation, which was advocated by Kelly in 1933. The advantage of those two, separately or combined, is that radical resections and amputations are avoided except in those cases where the extent of the injury or the vascular status of the part would make it imperative.

Prophylaxis in fresh open wounds which are grossly contaminated should be rigorous. Thorough débridement is necessary, but *Clostridium Welchii* antiserum is not used routinely. Frequent reports of gas-gangrene infections developing after the prophylactic injection of serum has made the sense of security following its use a false one. In several hospitals patients with compound fractures are now being given prophylactic irradiation. There have been no instances of gas gangrene in these series as yet. It has been our practice to give irradiation to the involved area. This consists of 75 röntgen units given on three consecutive days using a filter of 0·5 mm. of copper and 1 mm. of aluminium. A 200kV machine is used, with a skin distance of 50 cm. Of the antisera, that against tetanus is the only one used routinely. Sulphanilamide is used prophylactically only in the more severe wounds.

In our treatment of gas gangrene either of the trunk or of the extremities, irradiation is regularly used, often supplemented by sulphanilamide. The former is administered in doses of 75–100 r. depending on the size and depth of the infection. It is repeated for a minimum of three days. If at the end of this time the infection persists, irradiation is continued. It has never been necessary to give more than 1000 r. We have had three patients with trunk infection in the last year, all of whom responded to this regime. They are now living and well.

Sulphanilamide is used frequently; the blood level should be from 5 to 10 mg. per hundred c.cm. When it is not possible to give it orally it is given subcutaneously, 4 g. in 500 c.cm. of one-sixth molar sodium lactate.

The rest of the treatment is chiefly surgical. It consists of wide incision and drainage. At the time of operation it is usually noted that there is necrotic tissue in the wound. If this separates fairly easily, or if a large area is involved, it is removed. No effort is made to remove all of the dead tissue down to living muscle and fat. After this Carrell-Dakin tubes are inserted. Irrigations are commenced on a two-hourly basis using Dakin's solution which we have found to be satisfactory. Hydrogen peroxide has not seemed as efficient in clearing up the wounds. In addition it may liberate oxygen under the skin which could be mistaken for the gas from an advancing infection. Tetanus antitoxin is administered in all cases. If the patient seems very sick, or if infection is not readily controlled, gas-gangrene antiserum is given. Adequate fluid intake and high-caloric, high-vitamin diets are maintained. Electrocardiograms are taken as soon as feasible in these patients. On several occasions myocardial damage has been shown. Cardiac failure subsequently occurred in one of these patients, presumably from the infection, as there was no evidence of any other predisposing factor or previous disability.

Convalescence in our patients has often been prolonged. This is especially true in those with severe trunk infections, with the complaint of weakness most predominant. It has often been from four to six months before patients have been able to resume usual life.

It seems that one can separate true gas gangrene into two rough divisions. One is the massive fulminant infection occurring in extensive injury to a part in which the muscles appear to be especially

involved. Such involvement seems to have been predominant in the cases of the war of 25 years ago. In civil cases a relatively more benign type of infection has been more prominent, often with only subcutaneous involvement. Although these have had large tissue loss with tense and discoloured overlying skin, the muscles in the field of the advancing infection have been spared. While this latter type may be merely a forerunner of a more extensive infection which then rapidly dissects its way through the muscles, our experience indicates that it is a fairly discrete group. Fortunately it is more amenable to conservative treatment.

I am, Sir, yours faithfully,

ROBERT L. SEWELL.

School of Medicine, University of Rochester, New York.

EARLY PURGATION AFTER APPENDICECTOMY

SIR,—It is well known that the discomforts of the first two or three days after an internal operation are much more unpleasant for the patient than the actual operation itself. This is of course due to the intestinal stasis with the accompanying gas distension. Relief is always afforded as soon as the bowels move and the gas is expelled. This entails the use of enemata, often repeated, or flatus-tubes. For the last two years I have given a couple of vegetable laxative pills twelve hours after the operation, provided that vomiting has ceased. If another twelve hours elapse without a result I give a plain water enema, and since I have adopted these tactics I have never seen any of the familiar discomfort.

Old ideas die hard. The prevailing idea regarding the withholding of a purgative until the third day after an appendicectomy is based on the fear of opening up the internal operation area. But if the stump has been properly invaginated such firm adhesions are formed within twenty-four hours that this danger is negligible. The peaceful convalescence which I now see is a great contrast to the old days and the work of the nurse is reduced to a minimum.

I am, Sir, yours faithfully,

English Clinic, Tangier. F. J. W. PORTER.

EMOTIONAL CHANGES OF WAR-TIME

SIR,—It would be a pity if the emotional reactions to recent events passed unnoticed and no-one commented on them. I have observed a number of curious emotional variations which others may be able to amplify. Shortly before the war there seemed to be an increased valuation of animals with a corresponding diminution in the emotion attached to human beings. The picture of an injured man on the films evoked no response, whereas an injured dog produced moans of female pity. Again, a broadcast for a children's hospital produced a very small sum but an appeal for a dogs' home obtained a much larger response. There was almost a deification of the dog. I thought that this might be connected with the strong feelings of pacifism—i.e., psychical attempt to overcome aggression in the mind—but no change has occurred since the outbreak of war and the reaction remains inexplicable.

The onset of war seems to have released a great deal of sexual emotion which appeared mainly as scopto-exhibitionism and female homosexuality. This resulted in increased nakedness on the stage and in the adoption of male clothes by women—the latter ostensibly for convenience. The increased female nakedness on the stage produced a public outcry against it. The reactive forces seem to have won, at least temporarily, and managed to suppress it and the sexual jokes which presumably show the same tendency. Whether this strong instinctual force will break out elsewhere—it seems probable that it will—and how it will appear will be of interest to observe. Promiscuity, and excessive anxiety to protect the troops against it, may have increased but is difficult to assess.

Simultaneous with the release of sexual emotion there seems to have been an increase of religious feeling and it was recently stated that during a bishop's tour of the Western Front he confirmed seventy soldiers daily. Whether this is related to the increased sexuality or sadism (as a form of overcompensation) or whether it is a more conscious reaction to danger is again obscure. One might have expected that the condition of war would have released a great deal of sadism and masochism. This seems to have been in reality much less than in the previous war. Moreover the release seems to be in older (? and safer) men than in the younger ones. Whether there is a basis of masochism in the pacifist efforts one cannot say, but it seems probable. Some of the more belligerent of the opposite party seem to be definitely sadistic—the "Put 'em up against the wall school." In the majority of people there appears to be more pity—i.e., identification—for belligerents of both sides than previously.

No doubt there are others better placed than myself to observe these emotional changes and it would be of interest to hear of their experiences.

I am, Sir, yours faithfully,

Harley Street, W.1. CLIFFORD ALLEN.

TREATMENT OF HERNIA

SIR,—Surgeon Rear-Admiral Wakeley's plea for more attention to hernia surgery is particularly opportune at the present time when large numbers of men are desirous of being rendered fit for military service. The use of silk sutures will be endorsed by all who follow up their hernia cases. Its permanency must be of value and one seldom sees any immediate or remote ill effects of its use. In the treatment of inguinal hernia, I would question the desirability of bringing the external oblique together behind the cord thus losing much of the obliquity of the canal. I practised this method in direct inguinal hernia some years ago, but after having several recurrences alongside the cord I abandoned it in favour of the following technique, which I now use for all cases of established or potential direct hernia where operation is indicated.

The inguinal canal is opened in the usual way, displaying the bulging attenuated transversalis fascia framed in the arching fibres of the conjoint tendon. By light blunt dissection the inner part of this fascia is detached from the posterior surface of Poupart's ligament until the shining surface of Cooper's ligament is exposed. A broad spatula retracts the hernia and conjoint tendon whilst three or four stout silk sutures are inserted at regular intervals into Cooper's ligament by means of a No. 4 Mayo half-circle needle. Each end of the sutures is now reefed through first the transversalis fascia and then the conjoint tendon so that when tied back on to Cooper's ligament the transversalis fascia underslings the hernia and the conjoint tendon's normal attachment to the pectineal line is increased. In closing large defects it may be necessary to slide down a portion of the anterior rectus sheath or to turn up a flap of pectineal fascia. In any case the conjoint tendon is carried back

deepening the inguinal canal, an advantage when the often deficient external oblique aponeurosis comes to be closed in front of the cord. After completing the knots the same silk sutures are used to draw the deep surface of Poupart's ligament up to the anterior surface of the conjoint tendon. The external oblique is then closed in front of the cord. Often in direct herniæ the sac is not opened so separation from the bladder does not arise.

In the repair of femoral hernia it seems unnecessary to traverse and so weaken the inguinal canal when the "highest possible" repair can be very simply achieved by Henry's extraperitoneal approach. The solidity of this repair (using silk) is very convincing.

I am, Sir, yours faithfully,

Harley Street, W.1. KENNETH ARMITAGE.

BREAD

SIR,—The new method of milling wheat, recently described in the *Times*, by means of forced air and steel cutting knives breaks down the whole of the bran, germ, starch grains, &c., into a fine flour which contains only about 8½ per cent. of water in place of the usual 15 per cent. and 14½ per cent. of protein in place of about 9 per cent. in white flour, and all the minerals, and vitamins, A, B and E. Owing to the small percentage of water and the fine milling process this flour keeps very well and makes a most excellent bread. In the milling of white flour some of the best of the wheat is separated off and goes to feed chickens and pigs which do very well on this so-called offal. The white flour is robbed of vitamins and materials present in the natural food, and of much of the protein. The purchaser of white bread also buys in it far more water than he should. It is for the millions of not-well-off people that bread and flour should give all the properties of the natural wheat. The Government appeal to us not to buy articles which have to be brought by ship while they are allowing a large part of the imported wheat to be separated off as "offal" and not put into bread but fed to animals which are not necessary for healthy existence, if conditions become hard, and can be otherwise fed. Millions of Russians live on black bread and vegetable soup; they could not live on white bread.

I am, Sir, yours faithfully,

St. John Clinic, S.W.1. LEONARD HILL.

EXTRACRANIAL LIGATURE OF THE MIDDLE MENINGEAL ARTERY

SIR,—In reply to the letter of Mr. Graham Jessop and Prof. Lambert Rogers in your issue of April 27, I agree that the hæmatoma in civilian practice is usually extradural, but in war wounds (and I made it clear that my article referred to war wounds) the dura is usually injured and the hæmatoma usually subdural. The whole point of my article was to suggest how to minimise compression of the brain by ligaturing the artery as quickly as possible after wounding. This can be done at a first-aid post, but trephining cannot be done before the patient reaches hospital (see the opening sentence of my article on p. 643). "Stylomastoid process" was a slip and should have been "styloid process"; and the words "the facial nerve . . . passing from the stylomastoid foramen, behind the stylomastoid process, and through the parotid gland," though admittedly at first sight ambiguous, should not be so to a surgeon or an anatomist, who knows that the stylomastoid foramen lies behind the styloid process. The words "more medially" do not indicate a compass bearing but mean "on a more medial plane to that where the artery is being ligatured." In other words, the listed structures are safe from injury at operation because they lie at a deeper level.

I must repeat that this ligature is a life-saving practice to bring the wounded alive to hospital for trephining. Of the twenty-two months in 1915–17 that I was surgeon to a battalion of storm troops in the Tirol Alps there were not five in which a well-equipped ambulance was near my first-aid post. The wounded usually had to be carried by stretcher-bearers for many miles over rough steep mountain paths. It rests with the surgeon in such circumstances to decide between immediate ligature and possible death of the wounded man before he can reach hospital, where he can be trephined. There is, of course, no need for ligature in Cardiff, with its skilled surgeons in well-equipped hospitals just round the corner; but it may be useful somewhere else—say, in Norway.

I am, Sir, yours faithfully,

London. MAX WASSERMANN.

THERAPEUTIC POOLS

SIR,—In your condensed report (p. 835) of my short paper on the balneological treatment of war injuries an impression will, I am afraid, be given which I tried (and which is important) to avoid—namely, that a good deal of apparatus is necessary in therapeutic pools for casualties from the *Services*. I said that for these patients, as opposed to sufferers from rheumatoid arthritis and poliomyelitis, the amount needed was small—namely, under-water seats and parallel bars to assist walking.

I am, Sir, yours faithfully,

Droitwich. A. R. NELIGAN.

LIPOCAIC

SIR,—The summary of our work on lipocaic which appears on page 416 of your March 2 issue is correct except that we have not yet secured an active preparation of lipocaic from pancreatic glands in which the acinar tissue has degenerated as a result of ligation of the pancreatic ducts. In our experience, in the majority of animals in whom the acinar tissue of the pancreas has degenerated as a result of such duct ligation fatty infiltration of the liver does not occur, although an occasional animal may show this complication. We have not yet made an attempt to correlate the histology of the pancreas remnant in these cases with the liver changes. The experiment that you suggest is indeed important, and it should be possible as soon as we obtain a more rapid and simple method of assay than is at present available.

I am, Sir, yours faithfully,

Department of Surgery, University of Chicago. LESTER R. DRAGSTEDT.

RUSSIA claims to have established in the last twenty years 13 institutes of tropical medicine and to have 2700 anti-malaria institutes, of which the first 8 were organised in 1921 by the All-Union Institute of Tropical Diseases, itself set up at Moscow in 1920. It is said that, as a result, the incidence of malaria has declined sharply since 1928; that certain swampy areas have been drained and converted into orchards; and that over 38 million people (about an eighth of the population) were examined for malaria in 1937. With the numerous personnel employed and the vast amount of material for research it is strange that no important contribution to tropical medicine has come from Russia since the revolution.

IN ENGLAND NOW

A running commentary from our Peripatetic Correspondents

THE middle of April brought me new dressers. Do I love it or loathe it? I don't know. Certainly just after the last war I used to dislike it. I used to feel that I had just got them to the stage where they would be of use to me when I had to start afresh on a new firm. Now I think I like it. I find that towards the end of the third month I have been as much use to them as I can be at that stage of their development. One or two may come back as a house-officer or a clinical assistant later when one can again help them; but three months at any clinical subject is long enough for the student. There is, of course, regret at losing the old firm, and I believe they are sorry to go. Perhaps that is a good reason for their going. Another month and we might part without regret; we might even mutually slip away from one another without saying good-bye. The regret is lessened by the confidence that the new lot will soon be as charming. In the meantime they seem maniacs. They never imagine that a surgeon could be afraid of them; but up to now an element of fear has never been totally absent from the first meeting with my new firm. And their feet are so large. They entirely fill the floor of the outpatient department. One spends the morning tripping over them. The rapidity with which their feet diminish in size is the best indication of how one is getting on with them. I know now that if I can get them together from the first moment, and work very hard for a fortnight their feet will have so shrivelled that I shall not notice them. Then instead of being tied to the grindstone of dealing myself with every patient I become the chef de clinique walking about and consulting with my colleagues. Normally, this happens in about six weeks, with an heroic effort and in a particularly united firm it may do so at the end of the first month. When they straggle in from day to day, returning from examinations or a holiday, it does not begin till the end of the second, which is the same as not at all. I used to think this meant they were a bad firm, I now know it was because I had been lazy. There are no bad firms unless we make them so and one thing is certain. However much or little justification there may be for the diminished confidence that the people of this nation have had in the medical profession between the wars, the type of student that is passing through our hands to-day is as good a one as it has ever been in the forty years of this century. On the whole, then, I think I enjoy the arrival of my new firm; and one of my secret regrets is that it can only happen seven times more; and I used to count with dread the number of times it was still before me: ninety-two, ninety-one, ninety. How can I go on like this? And now—only seven; and soon—only six times more.

* * *

"And now, doctor, I have good news for you," he said, "I can definitely tell you that the war will be over by the end of the year." He was a small, one might almost say insignificant, little man and he had been sent to me for epilepsy. He hadn't got it. In fact his trouble was nothing more than hysterical hyperventilation tetany. I had just shown him how to hold his nose when an attack came on. "I've had the gift for about four years," he went on, "ever since I was in a car accident. I was not knocked out, but I fainted afterwards. Since then the future just comes to me, but I won't tell fortunes. That's abuse of my gift. However, I'm sure you'd like to know the future of this war." I said I would and my duty as a peripatetic made me jot it down.

"For months and months before the present war," he said, "I knew a war was coming. I knew the date three months before it happened. I knew Hitler was going to walk into Poland and take it in three weeks—and that would bring us in. Six weeks ago I knew he would go into Norway. I told them all he wouldn't touch Belgium—and he won't. He will be in Sweden within seven days. He won't do any good there, but it will take us months to get him out and the whole of Scandinavia will be laid waste. He won't touch Holland, but he'll walk into Switzerland, and they won't resist. All the same, it will be over by Christmas, probably about the last week in November. Hitler will be assassinated by Himmler. That one's after the power for himself. Then the German people will rise. Goebbels will get away, but Goering and Ribbentrop won't." I was sorry to hear about Goering. I've a sneaking affection for the fat old rascal. "His own people will make Ribbentrop pay dearly for what he's done before he dies. I reckon he caused this war. He was spying when he was over here as ambassador. After that there will be a different Germany. Their old royal family will return to power. Poland and Czechoslovakia will be freed, but not Austria. That will still be part of Germany. France will take control of the Rhine for ever, and we shall police Germany for many years. Germany will never rise again—she is finished. Russia too is heading for the last round-up; within two years there'll be another revolution there under that Trotsky. Oh! by the way, there'll be a new king in Norway within eight months." He paused for breath. "Italy, she's got her eye on Singapore, and she won't come in for a month or two. When she does, we shall beat her—easily. Mussolini's time is getting short. Within six months of coming in with Germany he'll be finished, and they'll be back to Pope, King and Queen in Italy, and that's all. Turkey is going to be affected—but I can't say how. I'm pleased to tell you, England won't be bombed—nor Germany either for that matter. There'll be no real war on the western front—only aerial war. I can tell you Germany's already moved three-quarters of her men away from there. After the war, everybody thinks there'll be a lot of unemployment—but there won't. There's going to be as much work as there is now. We shall still be making armaments. We shall be standing ready in case there is war in the far east. I can tell you war between the U.S.A. and Japan will start within eight months from now. Japan wants the Dutch East Indies and certain minor islands. America is going to take Holland's part, and it won't be a long war. Japan can't stand the pace. We shall keep out of it."

"How about the budget?" I asked. "I've known about it for weeks," he replied, "and I can tell you this. Cigarettes and whisky will remain up for three years, and the postage for two. They'll have to, so as to pay for the damage in Norway. And now I'll tell you one more thing. You're a very clever man"—I smiled charmingly—"but on one line only." He paused dramatically. "You're a surgeon." It was with real sorrow that I told him I had never done an operation in my life.

* * *

I have just been sampling colloid cocktails at a film preview. We started off with the cocktails and then collapsed temporarily to absorb a talky film. Then we had a film on food convoys. Then we had more colloid cocktails and colloidapsed to watch a coloured film of springtime in Palestine, afyer which we had more crooked coloured clocktoils I know dont how many I had the colours were lovely another springtail please coloured colloids.

* * *

We have lately had an outbreak of nocturnal pilfering at Guy's. The original Guy's House—the surgical block—has stood empty since its evacuation at the beginning of the war, but lights have been appearing mysteriously in its locked wards. Window panes have been carefully cut out in the local bank office on the hospital premises, and the hospital shop has been broken into. There are daily reports of

minor thefts in the nurses' home, and though no serious loss has been sustained these sinister activities are giving the authorities some anxiety. The black-out, the emptying of certain parts of the hospital, and the necessity for leaving many rooms unlocked to ensure that they will be readily accessible if there is an air-raid—all these factors assist and encourage the amateur thief who so often crops up in a hospital. Since Jan. 1, when students ceased to be billeted at the expense of the Ministry of Health, the hospital has had its own student fire squad, living in the hospital at the expense of the governors and forming the nucleus of an A.R.P. team. On bombless nights this "vigilance squad" patrols the hospital in search of unshaded lights and shady characters, but so far no arrest has been made.

PARLIAMENT

ON THE FLOOR OF THE HOUSE

By MEDICUS, M.P.

THE Prime Minister's statement on the operations in Norway made on Thursday of last week has so dwarfed all other parliamentary business as even to get somewhat out of perspective. This statement was made in reply to the question by Mr. Attlee as Leader of the Opposition: "Is the Prime Minister now able to make a statement on the position in Norway?" But immediately before that Mr. Attlee asked another question, whether the Soviet government have now put forward proposals for a trade agreement? That the Soviet government has indicated its attitude on trade negotiations and that exchanges are now going on between the British and Soviet governments are facts of the highest significance at the present time. In an economic sense the possibility of making such an agreement, duly taking into account the difficulties of the war situation, is a part of the immense series of changes and stresses which now has the whole world in its grip.

As far as the statement on Norway itself is concerned, if it is to be understood it must be seen in relation to the almost world-wide extension of the war front. The most significant part of the statement was perhaps not that the attempt to take Trondheim from the south has been abandoned but that "the injury to the German navy has been so substantial as to alter the entire balance of naval power, and to permit an important redistribution of the Allied fleets. . . . A British and French battle fleet, with cruisers and auxillary craft, is already in the Eastern basin of the Mediterranean on its way to Alexandria." As all the world now knows, this fleet is one of formidable dimensions and Egypt is ready for any eventuality.

Mr. Chamberlain made his statement with admirable self control, he showed indeed too little emotion to please some members who commented on his impassivity. But although the House was critical Mr. Attlee and Sir Archibald Sinclair agreed not to put supplementary questions and not to pursue the debate further on that day. Later, "through the usual channels," which means the Whip offices, the debate for this week was arranged and at the moment of writing, before this debate has begun, it is not possible to say what it will bring forth. But whatever the parliamentary reaction the effect on Parliament and on the nation is to bring it more closely towards unity than it has been before. And whatever the circumstances may be the nation is now aware of the tremendous gravity of a war situation which some superficial optimists had begun to regard as already a stalemate.

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We have not finished with the Budget yet—the purchase tax is to be discussed in detail and there is other business—but the new realisation of the vast scale of the war and its likely intensification will almost certainly bring forward new proposals. A greater effort to organise man-power, a greater effort to organise the use of our manufacturing resources, a greater drive towards a sane economy in the use of the materials, food as well as other things which we have at our disposal, will all be stimulated by the national awakening to the meaning of this war.

The coming twelve months will see many changes; an emergency budget later on is almost certain, a broadening of the basis of government may come sooner rather than later, and the call to everyone to give what service they can will be more and more insistent. Sweden a short time ago put into force legislation enabling any male from 16 to 70 to be called up for civilian duties. The method is not ours but everyone, man and woman alike, will certainly be needed with a consequent great change in the habits of the nation.

* * * * *

One of the parliamentary habits already changed is that of protracted discussion of bills on party lines. The Agricultural Wages (Regulation) Scotland Bill passed through its final committee stages and its third reading between 4.15 P.M. and 5.51 P.M. on the day Mr. Chamberlain made his statement, and in this period the House discussed both amendments and general principles. In a sense the British Parliament is moving in the direction of the French committee system, the one which prevails also, of course, in English local government. And we may go further in that direction. It is noteworthy also that on this same day when the Norway statement was made a long debate of over two and a half hours took place on allegations by a private member that Major Reid-Kellett had been treated unfairly, and that this gentleman's complaints as to waste, inefficiency and irregularities in the building of militia camps and factories had not been properly investigated. The investigation of grievances could hardly have been better exemplified and the interest in the matter, the subject of which touches so nearly on national expenditure, was fully justified.

Parliament is still the great court of appeal of the nation, and all members recognise the need to maintain its freedom to criticise, to condemn and, if need be, to reconstruct. In the days to come when burdens may be heavier and when economic changes proposed by Mr. Keynes and others may have to be made because there is no alternative, the function of Parliament will be of still greater service to the nation. The great task of the future is how to restrict personal consumption and how to expand more organisation and production. In this process the medical profession will be confronted with many problems of health and nutrition. And standards of health and nutrition are likely to be more important criteria than pounds, shillings and pence.

FROM THE PRESS GALLERY

Workmen's Compensation

IN the House of Commons on April 30, when the Workmen's Compensation (Supplementary Allowances) Bill was read a second time, Sir JOHN ANDERSON said that no comprehensive review of our system of workmen's compensation had taken place since the Holman-Gregory report in 1920. The main lines of the structure of workmen's compensation remained the same today as when the original act was passed in 1897. It was widely recognised that the time was ripe for an overhaul of this system and with the end in view the Government appointed a Royal Commission under the chairmanship of Sir Hector Hetherington in December, 1938. It might be some time before Parliament would be in a position to deal with the problem as a whole, but, bearing in mind the dissatisfaction which existed with the scales, the Government had entered into discussions with representatives of industry with a view to devising a temporary scheme for meeting cases of hardship.

Such a scheme was the basis of the present bill. No argument in favour of an all-round increase of compensation could be based on any change in conditions since the present rates were fixed by the act of 1923. The cost-of-living index at the end of 1923 was about 175; on May 17 this year the figure was about the same—178—only 1¾ per cent. higher. The general average wage-rate for the first quarter of this year was about 15 per cent. higher than in 1924. That meant that on the whole rates of compensation were higher under the existing law. This bill would provide substantial new benefits, not only in respect of accidents happening in the future but also in respect of those which had occurred in the past over a long period.

Mr. GREENWOOD, on behalf of the Labour Opposition, objected to the bill on the grounds that it was limited to a system of supplementary allowances in respect of wives and children, excluded any provision for single men and women, and therefore failed to recognise the necessity for an immediate all-round increase in the rates of compensation payable. He said that the Labour Party put in a claim for an improvement of all-round rates. The Government had chosen to reject a long-overdue demand which members of all parties had admitted. This was a meanly conceived measure and in the circumstances of today when industrial risks would become greater as the war proceeded he thought they might have expected a little more generosity.

QUESTION TIME

London University

Sir ERNEST GRAHAM-LITTLE asked the Home Secretary whether, in view of the unexpected course taken by the war, he was now able to modify the advice tendered by him to the schools of London University last summer, acting upon which they evacuated their students from London; and whether, in consideration of the crippling cost to the schools of continued evacuation, he would sanction their return in the coming autumn.—Sir JOHN ANDERSON replied: I have already explained the general views of the Government in this matter at a deputation from representatives of London University which I received last week. In view of the second part of the question, I should like to make it clear that no question of Government sanction is involved and that the decision rests with the responsible authorities of the university.

N.H.I. Dentists' Fees

Mr. E. G. HICKS asked the Minister of Health whether he had considered the scale of dental fees payable to the dental profession under the National Health Insurance scheme; and whether, in considering the dentists' claim for an increase, owing to the war, he would give full weight to the fact that about half of the fees, including any increase, fell directly upon the pockets of the working men and women of this country who themselves were bearing their share of the added financial burden cast upon them by the war.—Mr. WALTER ELLIOT replied: A claim has been put forward by dentists for an increase of the scale of charges for the treatment of insured persons entitled to dental benefit under the National Health Insurance scheme. This claim was addressed to the Dental Benefit Council as the body responsible for advising the Secretary of State for Scotland and me in the matter, and is now under consideration by the council.—Mr. RHYS DAVIES: Will you mind that if you grant an increase to dentists, panel doctors and others will want to follow suit? Mr. ELLIOT: All these considerations will be taken into account.

Medical Orderlies in the W.A.A.F.

Mr. RALPH ETHERTON asked the Secretary of State for Air why medical orderlies and cooks in the Women's Auxiliary Air Force, many of whom were specially recruited, were graded in the lowest grade, namely, A.C.2; whether there was a proper establishment under which medical orderlies could obtain the rank which their training experience and responsibility warranted, and whether he would rectify the present anomalies.—Sir SAMUEL HOARE replied: Members of the Women's Auxiliary Air Force are employed only as sick-quarters attendants on members of that force who are sick in quarters and not sent to hospital. Any skilled nursing necessary in such cases would be carried out by members of Princess Mary's Royal Air Force Nursing Service and trained members of voluntary aid detachments. The majority of the personnel are therefore appropriately graded as aircraftwomen 2nd class. I am aware that some members have been found since their enrolment to possess skilled qualifications and the question whether any higher mustering can be accorded them is now under consideration. In regard to cooks, there is an adequate establishment by ranks but this, as with all Women's Auxiliary Air Force establishments, is kept under review.

Weil's Disease

Lieut.-Colonel A. P. HENEAGE asked the Minister of Health if his attention had been called to illness and death caused by Weil's disease spread by rats in seaports; and what steps he was taking to counteract this.—Mr. ELLIOT replied: I am aware that cases of Weil's disease occur from time to time, but the disease is not specially a feature of seaports. The dangers of this disease have been referred to in recent reports by my chief medical officer, and local authorities generally are aware of their powers and duties in connexion with rat destruction. I do not, therefore, think it necessary to make any special recommendations in this matter at the present time.

Advertisements in Stamp Books

Sir ARNOLD WILSON asked the Postmaster General whether, in view of the increased revenue now derived from the sale of postage stamps, he would arrange to discontinue the advertisements in postage stamp booklets of appeals to the public to spend money upon alleged remedies and appliances of which the British Medical Association disapprove, and the publicity given to which all responsible medical authorities deplored.—Mr. W. S. MORRISON replied: The alteration in longstanding policy suggested means forgoing the revenue derived from these advertisements; and I am not prepared to give this up, in view of the present heavy expenditure on national services.

Clacton Casualties

Mr. HOLMES asked the Minister of Pensions what action he had been able to take to deal with claims by sufferers eligible for compensation in respect of injuries received from the recent tragic incident at Clacton-on-Sea.—Sir W. WOMERSLEY replied: An officer of the ministry was dispatched to Clacton early on the morning after this incident, when he took immediate steps to visit hospitals and otherwise to get in touch with the injured persons. Necessary treatment was found to have been provided with great promptness. My representative made immediate arrangements for the opening of a local sub-office, and with the help of the assistance board's local officer took steps to make known, by means of posters at post offices and other places, the arrangements for the grant of injury allowances and pensions. It is too early yet to give particulars of the claims that may arise, but an officer of the ministry will be available to ensure that any necessary advice is provided.

Protection against Eye-wounds

Sir IAN FRASER asked the Secretary of State for War if the Cruise visor for protection against preventable eye wounds had now been approved; and what steps he was taking to bring it into use in the Army.—Mr. OLIVER STANLEY replied: A small number of these visors were sent to France for trial, but the reports received were inconclusive. It has been decided to make further trials with a larger number, and these are now in course of production.

Women Doctors for the A.T.S.

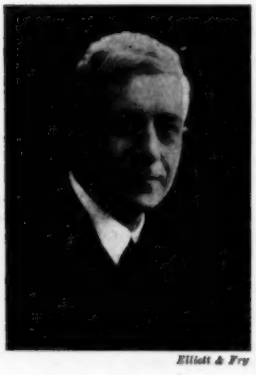
Miss WARD asked the Minister whether in order to advise the responsible authorities on health and hospital services in the Auxiliary Territorial Service he will consider appointing a woman doctor in a senior rank to each command.—Mr. OLIVER STANLEY replied: This matter is under consideration.

OBITUARY

HENRY DEVINE

O.B.E., M.D. LOND. AND BRIST., F.R.C.P.

Dr. Devine, who died on May 1 at Portsmouth, was one of the outstanding figures in British psychiatry. Son of A. C. Devine, formerly postmaster of Colchester, Henry Devine was born on May 2, 1879, educated at the Merchant Venturers School, and entered the medical school of Bristol University where he qualified in 1902. Later he took a London medical degree and was awarded the gold medal in psychiatry at the M.D. examination; he was elected F.R.C.P. in 1919. After qualification he turned to psychological medicine, which became the dominating interest of his professional life. He entered the L.C.C. mental hospital service at Cane Hill and was transferred to Long Grove at Epsom when it was opened in 1907 by Sir Hubert Bond. Among the keen young men who staffed this hospital Devine at once took a prominent position. He had by this time been awarded the Gaskell prize of the Medico-Psychological Association and he seized the opportunity afforded him by a grant of special leave to study at Kraepelin's clinic in Munich, then the Mecca of psychiatry in Europe. From Long Grove he went as senior medical officer to Wakefield mental hospital, the home of able men like James Crichton-Browne, Bevan Lewis, and Shaw Bolton; and then as medical superintendent to the Portsmouth mental hospital. During the late war, when this hospital was partly converted to military purposes, Devine was officer commanding there, being awarded the O.B.E. and appointed consulting psychiatrist to the Royal Victoria Hospital at Netley. Finally he became medical superintendent of the Holloway Sanatorium at Virginia Water, remaining there until his retirement, from ill health, in 1938. He was a good administrator and was responsible for many improvements and new ventures both at Portsmouth and Virginia Water. He was also busily engaged outside: as examiner in psychology R.C.P., lecturer in psychology at the Maudsley Hospital, and president of the psychiatric section of the Royal Society of Medicine. When the British Medical Association met at Portsmouth in 1923 he was naturally selected to preside over the section of neurology and psychiatry. He was deeply concerned in the psychological problems of childhood, and played a prominent part in the work of the Child Guidance Council.



Elliott & Fry

Devine's writings were distinguished not so much by the initiation of original lines of thought as by a comprehensive grasp of the value and import of the contributions offered to psychiatry by the various schools of his time. In this field of divergent views he maintained a balanced and impartial attitude, ready to examine and appraise every alleged advance and to coördinate it, if it could be established, in the structure of psychiatry. His interest ranged over every line of approach which promised to aid in the solution of psychiatric problems, from neurology and chemistry to psychology and sociology. For long he contributed every year to the psychiatric section of the *Medical Annual*, a duty which he embraced with enthusiasm because it meant keeping up to date with the growing flood of psychiatric literature at home and abroad. Extensive reading enabled him to produce in 1929 the book which must be regarded as his chief contribution to medical literature "Recent Advances in Psychiatry." This work attempted the sorely needed task of coördinating and placing in perspective the divergent and largely independent schools of scientific thought in modern psychiatry. The task was accomplished with success and the book, for which a second edition was soon demanded, remains one of the most helpful and illuminating available to the student. His other works included many papers to psychological and psychiatric journals, and the articles on "Psychoses" in the Encyclopædia Britannica and in various systems of medicine.

Devine's personality was extraordinarily attractive. He was, writes B. H., universally popular, and it is not too much to say that he was one of those rare beings who are universally loved by all who come in contact with them, both subordinates and friends. He was always "Henry" to his friends, and personal characteristics which might have been defects in another man, notably a charming absent-mindedness in everyday life, seemed in him to fit with absolute congruity into a character which endeared him to all.

Dr. Devine married Phyllis, daughter of George Hanson, who with two sons survives him.

CONRAD THEODORE GREEN

T.D., M.R.C.S., D.P.H., COLONEL A.M.S.

Colonel Green, who died on April 24 at Oxton in his 77th year, had played a large part in the life of Birkenhead. Born at Kirkburton, Yorks, the eldest son of the Rev. Conrad S. Green of Buxton, he qualified from St. George's Hospital in 1887 and settled in the Wirral peninsula where he soon became dispensary doctor and medical officer to the 1st V.B. Cheshire regiment. As a territorial medical officer and as admiralty surgeon and medical examiner of recruits for the yeomanry he was in a good position at the outbreak of the late war to take over command of the Cardiff casualty clearing station with charge of a Welsh division. He was made an assistant director of medical services, after four years being promoted colonel. Later in the war he was acting deputy director at Bury St. Edmunds and on demobilisation went to the Ministry of Pensions as deputy commissioner of medical service. On his return to Birkenhead he kept in touch with the local Red Cross centres while remaining chairman of medical boards at the Ministry. In 1889 he married Frances, eldest daughter of Edward William Cropper, J.P., of Liverpool. Their daughter is now attached to a first-aid post; of his three sons the second met his death at Gallipoli and the youngest, Dr. Norman Green, is attached to the C.M.S. hospital at Maseno, Kenya.

A colleague writes: In Colonel Theodore Green Merseyside has lost a well-known practitioner who, in addition to his routine work, found an outlet for other interests in his extensive surveys of local flora and fauna. Over fifty years he produced thousands of coloured slides for his many lectures, and finally distributed them between various museums. From his early days a keen volunteer, and later territorial

officer, he took his D.P.H. in 1913 to improve his efficiency in camping matters, and served throughout the late war. His great regret was that he was unable to serve again in the present emergency.

GEORGE YOUNGER RICHARDSON

M.D. EDIN., D.P.H.

ON May 1 Dr. George Richardson, medical officer of health for the counties of Midlothian, West Lothian and Peebles, died suddenly in Edinburgh. He was educated at the Royal High School and the University of Edinburgh, graduating M.B. in 1906. After some years spent studying children's diseases in London and midwifery and French hospital methods at the Clinique Tarnier in Paris, he returned to Scotland and took the diploma of public health in 1910. In 1913 his thesis for the M.D. degree on tuberculin as a dispensary agent in the diagnosis and treatment of tuberculosis received commendation. In the course of the last war he served with the R.A.M.C. in France and Belgium until he was invalided home. He held public-health posts in Leith, in the county of Ayr and in Cumberland before he was appointed county medical officer of health for East Lothian in 1919. Nine years later, on the death of Dr. Robb, he took up his work for the three counties. During his period of service the health services and hospital administration under his direction reached a high standard of efficiency. For the past four years he had been active in planning the extension of the Tippethill fever hospital in West Lothian and in completing the maternity-services scheme. Since the outbreak of war his work had been greatly increased by A.R.P. duties and the provision of military hospitals

Dr. Richardson, who was 59 years of age, is survived by his wife and a son.

ALMA SUNDQUIST

Dr. Alma Sundquist, who died in Stockholm early this year, was born in 1872 at Torp, Medelpa, in Sweden. She studied medicine at Upsala and Stockholm and after graduation in 1900 she visited Paris and Vienna. She chose as her specialty gynæcology, dermatology and venereal diseases, and in 1903 she was appointed head physician of the first free clinic in Stockholm for the treatment of women suffering from venereal disease. In recognition of her work there she was appointed to a royal commission which considered measures for the prevention of venereal disease. The report of this commission which was published in 1921 embodied her recommendation that sex education should be included in the ordinary school curriculum, and by this she meant more than the mere teaching of biological and social facts. It was also to be an education towards a higher conception of sexual life, and much of the rest of her life was devoted to this work. When the reform was later introduced in the Swedish schools she was asked to give the preliminary lectures to the teachers. In 1930 she was chosen one of the three members of the League of Nations committee of inquiry into the traffic in women and children in the east, and in connexion with this investigation she travelled widely in Asia. In 1934 she became a member of the Swedish royal commission which revised the abortion laws and later she was appointed to the pregnancy commission and the population commission. In 1933 she was elected president of the Swedish Dermatologists' Association. Her personality and her work were both recognised by medical women when in 1934 they appointed her president of the Medical Women's International Association.

Medical News

University of Oxford

The summer dinner of the Oxford Graduates' Medical Club will be held in Magdalen College on Friday, June 28, at 8 P.M. Dr. W. D. Sturrock will be in the chair.

University of London

Prof. F. R. Fraser has been reappointed to the Senate as representative of the faculty of medicine, and Sir Charles Wilson as representative of the general medical schools. Lord Dawson has been coöpted by the Senate.

The diploma of D.P.H. has now been awarded to T. K. Abbott who passed the examination in June, 1939.

Royal College of Surgeons of England

On April 30 the Earl of Athlone visited the college to receive the diploma of honorary fellow. In presenting the diploma, Mr. Hugh Lett, the president, paid tribute to Lord Athlone's interest in education, particularly postgraduate medical education, nursing, and the hospitals. In the college he had been a trustee of the Hunterian collection for 17 years, he had formally opened the Bernhard Baron laboratories in December, 1937, and he had been present at Hunterian festivals.

Scottish Conjoint Board

The following having passed the final examination of the board were on May 1 admitted licentiates of the Royal Colleges of Physicians and Surgeons of Edinburgh, and of the Royal Faculty of Physicians and Surgeons of Glasgow :—

M. M. Aly, Mary C. Clay, Murray Cogen, J. H. C. Corr, W. P. Forrest, R. H. Georges, A. N. Godholm, J. C. Greenfield, D. B. Handelman, G. I. Heron, Ellan B. Ho-A-Yun, Harry Holzer, Edward Iskander, Gattas Iskander, Muttutamby Kanagaratnam, P. J. McGinley, A. E. McKay, A. J. MacQuillan D. I. C. Milton, S. H. Myers, J. G. Palin, Lionel Phillips, C. M. Ramakrishna, Wolf Rapoport, E. Z. T. Salama, J. H. P. Stewart, W. F. J. M. Thom, and B. C. Weerappah.

The following graduates of recognised universities, having passed the final examination, were also admitted licentiates of the colleges and faculty :—

H. G. J. Herxheimer, Erich Hohenberg, and E. C. Kalmar.

Lebanon Hospital for Mental Diseases

The 41st annual meeting of this hospital will be held on May 21 at 4.45 P.M. at the Cora Hotel, Upper Woburn Place, London, W.C.1. Sir Harold Satow, former consul-general at Beirut will be in the chair, and other speakers will include Dr. Isabel Wilson, Pastor Pradervand, and Mr. H. Lyn Harris. Subscriptions from Europe have already fallen since the outbreak of the war and a special appeal is being made to neutral nations at a distance to maintain this international hospital through difficult times. Further information may be had from the secretary, Miss Hilda Fox, Drayton House, Gordon Street, London, W.C.1.

London Medical Exhibition

The exhibition will take place this year at the Royal Horticultural Hall, from June 24 to 28.

Advertising of Aphrodisiacs

Condemnation of the advertising of aphrodisiacs has been expressed by the statutory committee of the Pharmaceutical Society in the strongest possible terms. The occasion was the hearing on May 1 of the first case of alleged infringement of the code of ethics which the council of the society has laid down as a guide for members (see *Lancet*, 1938, **2**, 840). A pharmacist was alleged to have distributed to the public by post and without invitation a pamphlet of indecent nature contrary to the rule of the code which says that " advertisements of medicines should not be issued to the public referring to sexual weakness." His six-page pamphlet is entitled " new life for weak men and women by means of the newly discovered hormonal treatment," and contains matter which the chairman said no decent man would discuss " with anybody except a most intimate friend or with his doctor." The registrar was directed to remove the pharmacist's name from the register.

Pharmaceutical Society

At the council meeting on May 1 three honorary members were elected: Sir Ernley Blackwell in recognition of his services as chairman of the society's statutory committee 1934–39: Sir William Willcox, the Privy Council visitor to the society's examinations; and Colonel R. N. Chopra, professor of pharmacology in the school of tropical medicine, Calcutta.

National Union of Students

A conference of medical students will be held at Manchester University on May 18 and 19 to discuss medical education and its war-time problems. Further information may be had from the secretary of the London medical committee of the union, 3, Endsleigh Street, W.C.1.

British Postgraduate Medical School

From June 3 to 7 Mr. R. Watson Jones will give a course of lectures and practical demonstrations on the treatment of fractures with special reference to war conditions. A limited number of officers of the armed forces will be admitted free. Further information will be found in our advertisement columns.

Medical Diary

Week beginning May 13

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1.
THURSDAY.—2.30 P.M., Dr. George Graham: A Survey of Recent Work on Diabetes Mellitus—Ætiology and Treatment. (Croonian lecture.)

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2.
THURSDAY.—4 P.M., Prof. A. D. Macdonald: Experimental Spinal Anæsthesia.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.
TUESDAY
Therapeutics and Pharmacology—2.30 P.M., annual general meeting. Dr. H. S. Banks, Dr. G. E. Harries: Modern Methods in the Treatment of Cerebrospinal Fever.
Psychiatry—4.30 P.M., annual general meeting. Dr. Lindesay Neustatter: Social and Economic Factors in Psychiatry.
THURSDAY
Dermatology—4 P.M., cases. 5 P.M., annual general meeting.
Neurology—5 P.M., annual general meeting at the National Hospital, Queen Square, W.C.1.
FRIDAY
Obstetrics and Gynæcology—5 P.M., annual general meeting. Mr. Leslie Dodds: Forty Consecutive Cases of Ectopic Pregnancy. Mr. Aleck Bourne and Dr. L. T. Bond: Pathology of Cervicitis.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portland Place, W.1.
THURSDAY.—4.30 P.M., Dr. Frederick Murgatroyd: Immunisation against Human Rickettsial Diseases. Dr. G. M. Findlay will also speak.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12.
WEDNESDAY.—11.30 A.M., clinico-pathological conference (medical). 2 P.M., Prof. J. H. Dible: Pathology of meningitis. 3 P.M., clinico-pathological conference (surgical).
THURSDAY.—2 P.M., Dr. Duncan White: radiological conference.
FRIDAY.—2 P.M., clinico-pathological conference (gynæcological). 2.30 P.M., Mr. V. B. Green-Armytage: sterility clinic. 2.30 P.M., Dr. Hinds Howell: ward clinic.
DAILY.—10 A.M.–4 P.M., medical clinics; surgical clinics and operations; obstetrical and gynæcological clinics and operations. 1.30–2 P.M., post-mortem demonstration.

FELLOWSHIP OF MEDICINE AND POSTGRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.1.
MONDAY and THURSDAY.—5 P.M. (Brompton Hospital, S.W.3), M.R.C.P. course in chest diseases.

Vacancies

Aberdeen Royal Infirmary.—Gynæcological registrar, £300.
Altrincham, St. Anne's Hosp.—Res. surg. O., at rate of £200.
Ashford, Kent, Grosvenor Sanatorium.—H.P., at rate of £100.
Belfast, Queen's University.—Five Musgrave studentships, each £200.
Birmingham City.—Asst. res. M.O. for Erdington House, £300.
Bradford, Royal Eye and Ear Hosp.—H.S. to ear, nose, and throat dept., £180.
Bristol Eye Hosp.—Res. H.S., 6 guineas per week.
British Postgraduate Medical School, Ducane Road, W.12.—Obstet. H.S. and five H.P.'s, each at rate of £105.
Buxton, Devonshire Royal Hosp.—H.P., at rate of £150.
Bury St. Edmunds, West Suffolk General Hosp.—H.S., £150.
Cambridgeshire County Council.—H.S. and H.P. at County Infirmary, £200.
Chester, Upton Emergency Hosp.—Jun. res. H.P., £200.
Chesterfield and North Derbyshire Royal Hosp.—Res. surg. O., £300. Also H.S. and asst. cas. O., and H.P., at rate of £150.
Chichester, Royal West Sussex Hosp.—Jun. H.S., £125.
Chorley, Chorley and District Hosp.—H.S., at rate of £150.
Coventry and Warwickshire Hosp.—Two H.S.'s to spec. depts., each at rate of £150.
Derbyshire Education Committee.—Temp. asst. school M.O., at rate of £500.
Dudley Guest Hosp.—Cas. H.S., £150.
Durham University.—Demonstrator in pathology in medical school and asst. pathologist to Royal Victoria Infirmary, £300.
Enfield, Edmonton and Potters Bar Hosp., Winchmore Hill, N.21.—H.S., at rate of £200.
Halifax County Borough.—Asst. M.O.H. maternity and child welfare, £500.
Hertford County Hosp.—H.P., at rate of £150.
Heston and Isleworth, Borough.—Temp. asst. M.O., £550.
Hosp. for Sick Children, Great Ormond Street, W.C.1.—H.P.'s and H.S.'s, each at rate of £100.
Huddersfield County Borough.—St. Luke's Hospital, R.M.O., £230.
Hull Royal Infirmary.—Cas. O., at rate of £150.
Lancashire County Council.—Sen. and jun. H.S.'s for Biddulph Grange Orthopædic Hosp., at rate of £300 and £250 respectively.
Leeds City.—Res. M.O. for St. Mary's Infirmary, £250.
Leicester City.—Res. M.O. for City General Hosp., at rate of £300.
Manchester, Ancoats Hospital.—Asst. pathologist, £350–£400.
Manchester City.—Jun. res. asst. M.O. (Grade 2) for Monsall Hosp., at rate of £250.
Manchester Royal Infirmary.—Second res. clin. path., £150. Res. jun. M.O., at rate of £150. Also three H.S.'s to spec. depts., each at rate of £50.
Manchester, Saint Mary's Hosps.—Two obstet. H.S.'s, each at rate of £50.
Manchester, Duchess of York Hosp. for Babies.—Jun. res. M.O., £100.
Middlesbrough, County Borough.—Res. surg. O. for emergency hosp., £550.
Ministry of Supply, The Adelphi, W.C.2.—M.O.'s for Royal Ordnance Factories, each £650.
Newcastle upon Tyne, City and County.—Res. med. asst., at rate of £250. Also H.P.'s and H.S.'s, at rate of £200 and £150, for spec. hosps.
Nottingham General Hosp.—H.S. and res. cas. O., each at rate of £150.
Oldham County Borough.—Res. asst. M.O., at rate of £200.
Paisley, Dykebar Mental Hosp.—Locum tenens asst. M.O., 7 guineas per week.
Plymouth, Prince of Wales's Hosp., Greenbank Road.—Res. surg. O., at rate of £225. Also sen. H.S. and H.S., at rate of £130 and £120 respectively.
Preston County Borough.—Jun. asst. R.M.O. for Sharoe Green Hospital, at rate of £100 or £150.
Preston, County Mental Hospital, Whittingham. L.T. asst. M.O., £8 8*s.* per week.
Preston and County of Lancaster Queen Victoria Royal Infirmary. Two H.S.'s to spec. depts., each at rate of £150.
Queen's Hosp. for Children, Hackney Road, E.2.—H.P., cas. O., and H.S., each at rate of £100.
Reading, Royal Berkshire Hosp.—Cas. O., at rate of £150.
Rochdale County Borough.—Temp. res. M.O., £350.
Rochdale Infirmary and Dispensary.—Second H.S., £150.
Rotherham County Borough.—Asst. res. M.O., £350.
Royal Cancer Hospital, Fulham Road, S.W.3.—Asst. radium therapist, £400. Also H.S.'s, at rate of £100.
Royal Chest Hosp., City Road, E.C.1.—H.P., at rate of £200.
Royal Eye Hospital, St. George's Circus, S.E.1.—Asst. H.S., at rate of £100.
Sheffield Children's Hospital.—H.S., at rate of £100.
Sheffield, Royal Hosp.—Asst. pathologist, £300.
Sheffield Royal Infirmary and Hosp.—First asst. to spec. depts., each £300.
Smethwick, County Borough.—H.P. and anæsthetist for St. Chad's Hosp., at rate of £150.
Staffordshire County Council.—H.S. for Standon Hall Orthopædic Hospital, £250.
Stoke-on-Trent, North Staffordshire Royal Infirmary.—Orthopædic H.S., at rate of £150–£200. Also res. cas. O. and H.P., each £150.
Surrey County Council.—Asst. M.O. for Redhill County Hospital, £350.
Swindon Borough.—M.O.H., £900.
Taunton and Somerset Hosp.—H.P., £150.
Wakefield, Clayton Hosp.—H.P., at rate of £150.
York County Hosp.—Res. H.S. and res. H.P., each £150.

Appointments

BORG, J. R., M.D. Malta, M.R.C.O.G., L.M., D.G.O., temporary assistant medical officer at Towniey's Hospital, Bolton.
BURTON, Harold, B.M. Oxfd, D.R.C.O.G., resident obstetrical officer at Oldham Municipal Hospital.
BUTTERWORTH, BEATRICE A., M.B. Lond., M.R.C.P., temporary physician to outpatients at Hampstead General Hospital.
CABLE, J. V., M.B. N.Z., M.R.C.P., temporary senior assistant pathologist at Dudley Road and Selly Oak Hospitals, Birmingham.
GLENNIE, H. H. I., M.B. Aberd., resident casualty medical officer at the Central Middlesex County Hospital, N.W.10.
JONES, F. A., M.D. Lond., M.R.C.P., physician (grade I) at the Central Middlesex County Hospital, N.W.10.
THOMPSON, J. W., M.R.C.S., resident assistant medical officer at Wordsley Public Assistance Institution.
TAYLOR, SHIRLEY, M.D. Manitoba, D.C.H., registrar at the Duchess of York Hospital for Babies, Manchester.
WESTELL, UNA M., M.R.C.S., D.A., assistant medical officer at Redhill County Hospital, Edgware.

Examining Surgeon under the Factories Act, 19 : Dr. P. M. BENNETT, Thornhill, Dumfries.

NOTES, COMMENTS AND ABSTRACTS

PEDICULOSIS CAPITIS TREATED WITH SPIRITS OF QUASSIA

BY GUSTAV JØRGENSEN, M.D.
CHIEF MEDICAL OFFICER OF SCHOOL HYGIENE IN COPENHAGEN

FOR many years spirits of sabadilla or spirits of camphor have been used in the municipal schools of Copenhagen for the treatment of head-lice. Neither of these preparations is satisfactory in treatment on a large scale: their effects are not absolutely sure, because time after time children come for further treatment; and their action is not rapid, each child having to sit with her hair wrapped up for 20 mins. A further drawback is the disagreeable and penetrating smell, which draws attention to the fact that the child has undergone treatment for lice.

Learning that spirits of quassia were used in Malmö for the treatment of lice, I got in touch with Dr. J. Axel Höjer, the chief medical officer of health in Malmö, who assured me of its efficacy; so I introduced it experimentally into two municipal schools in Copenhagen. Dr. Höjer's directions for preparing the quassia are are follows:

Add 150 g. of finely cut cortex quassiæ to 1 litre of concentrated spirits and 3 g. of chloroform. This is to be kept for fourteen days at room temperature and then filtered through a layer of gauze before being used.

It is a clear light-yellow liquid without smell. Treatment consists in rubbing the spirits of quassia into the whole of the hair and the scalp with cotton-wool or a brush until they are dripping wet. The hair is then wrapped in a towel for 5 min., after which it is combed with a fine steel comb. The first ten days after the treatment the hair should not be washed with soap. One such treatment is sufficient.

The results have been so good that treatment with spirits of quassia has now been introduced into all municipal schools in Copenhagen. The preparation is also supplied, free where necessary, for home use, because there was always a proportion of infected children representing 2·2 per cent. of the total number in the municipal schools of Copenhagen, many of them being reinfected by other children, in the same home, who have lice and are not yet of school age. Since this has been done, the proportion has dropped to 0·4 per cent.

SUBSTITUTE FOR COD-LIVER OIL

THE prospects of replacing stocks of cod-liver oil, when existing supplies are exhausted, are uncertain for two reasons. British production on a large scale has been impracticable since most of the trawlers engaged in the industry were requisitioned for the Royal Navy, and imports from Norway, the other main source of supply, ceased to arrive after the first week in April. The stocks held by the British producers at the beginning of the war have been steadily drawn upon by consuming interests, and it became necessary last week for the producers to withdraw market quotations and to confine their sales to regular customers on a rationing basis. Substantial quantities of the oil had been received from Norway up to the beginning of April, for Norwegian production, in which some 7,000 fishing vessels were engaged, had been unusually abundant until then. Thus while there is no immediate shortage of Norwegian cod-liver oil in this country, nobody has the remotest idea when shipments from Norwegian ports will be resumed. Consequently it is necessary to husband existing supplies. In the circumstance it seems desirable that the promised standard (see THE LANCET, April 20, 1940, p. 752) for an emergency substitute for this important commodity should be published as an addendum to the British Pharmacopœia with the least delay possible. The secretary of the Pharmacopœia Commission stated recently that it was proposed to include in the draft Pharmacopœia, to be submitted for the approval of the General Medical Council, a monograph on a vitaminised oil standardised to contain vitamins A and D in the proportion contained in a good average specimen of cod-liver oil. We are informed that the oil which it is proposed to specify as the vehicle for these vitamins is arachis oil, which is variously known in commerce as nut oil, ground-nut oil and pea-nut oil, and whose properties are similar to those of olive oil. It is significant that the parliamentary secretary to the Ministry of Food recently said in the House of Commons that ground-nut oil was being "allocated" for various uses, and it may be assumed that supplies will be earmarked for the manufacture of the official cod-liver oil substitute. Those who hold the view that the virtues of cod-liver oil lie in the whole oil and not merely in certain of its components will for the time being be able to go on prescribing the oil expressed from the liver of the cod, but those who are satisfied that the vitamins presented in the prepared form serve the purpose equally well should rely on the substitute.

DEATH FROM BLOOD-TRANSFUSION

IN discussing the pathology of death from blood-transfusion at a meeting of the Pathological Society of Manchester on April 10 Prof. S. L. Baker said that a patient may die as the result of a transfusion within a few minutes or hours or after some days.

The causes of rapid deaths are usually difficult to separate from the primary condition for which the transfusion is given. The intravascular hæmolysis of incompatible or damaged blood-cells produces immediate ill effects, the patient becoming distressed, with a rise of temperature and lumbar pain. Exactly how these effects are produced is uncertain. A patient who is in a precarious state may, however, die as a result of them. Or he may survive this stage but die later from renal failure. In this case there is suppression of urine with progressive nitrogen retention. Urine passed during the 24 hours after the transfusion contains dark brown blood-pigment. These delayed deaths are from renal-tubule blockage by blood-pigment precipitated during the excretion of hæmoglobin. This lesion of the kidney (hæmoglobin infarction) has been known for a long time, particularly in blackwater fever, where a uræmic death may be produced by it. The mechanism by which this precipitate is produced was first elucidated by Dodds and Professor Baker in 1925. Hæmoglobin, being of lower molecular weight than the serum proteins, is excreted by the glomeruli when its concentration in the plasma reaches about 0·3 g. per 100 c.cm. Rapid hæmolysis of about 1/40th of the total corpuscles, or the hæmoglobin derived from 50–100 c.cm. of blood would give this threshold value. The hæmoglobin is excreted in solution in the glomerular filtrate, but this becomes concentrated in its passage through the renal tubules. If the salt concentration exceeds about 1 per cent. of NaCl with a pH of 6 or less, hæmoglobin is precipitated as a granular deposit of hæmatin. These conditions occur in the renal tubules during the excretion of an acid concentrated urine and the precipitate may block the tubules. If the urine is not acid no precipitate forms and no renal damage is produced. The reaction is quantitative, and if the precipitate is not too massive the kidney can expel it, as can be proved by the appearance of brown granular casts in the urine. If hæmoglobinuria is present a markedly acid urine is "blackwater," while a neutral or alkaline one is red. Intravascular hæmolysis may result from incompatible or damaged red cells. Red cells become more fragile the longer they are stored. Fragile red cells are liable to rapid

hæmolysis in the circulation and blood stored too long contains both free hæmoglobin and fragile red cells.

Professor Baker ended by making some practical suggestions for prevention. He advised that the urine should be kept alkaline during and for 24 hours after transfusion; it should be examined several times for hæmoglobin after transfusion and the urinary excretion should be closely watched. Professor Baker also urged that the use of stored plasma should be further extended. It would be as good as blood in probably 75 per cent. of cases where shock is the main feature, and appears to be free from many of the risks of whole blood.

DOCTORS CALLED IN BY MIDWIVES

THE Minister of Health has issued regulations that will come into force on June 1, fixing a new scale of fees to be paid by local supervising authorities to doctors called in by midwives. If he is to be entitled to such fees the doctor must not have agreed to attend the patient either privately or through a club, or be under any obligation to attend her under the N.H.I. acts or any agreement with the local authority, and he must not make any charge to the patient herself. No fee will be payable for services rendered more than 4 weeks after the baby's birth, or, except by special arrangement, more than a fortnight after the doctor's first visit, and in each case the doctor must send a report on the prescribed form to the M.O.H. For attendance during labour and visits during the next fortnight the fee is 3 guineas, or 2 guineas where only one visit is made during labour and the doctor is not present at the birth or subsequently. A second doctor called in to give an anæsthetic, whether for a miscarriage or during labour, is entitled to a guinea. For suturing the perineum, removing an adherent placenta and the like, including necessary visits, the fee is 1½ guineas and the same fee is payable for attendance at a miscarriage or a threatened one. The fee for any visit not included under these headings is 5*s.* by day or 10*s.* by night, or 7*s.* 6*d.* and 15*s.* where both mother and child need attention, mileage being extra. Half a crown is paid for attendance at the doctor's surgery.

COLLOIDS IN MEDICINE

THE opening scene of the Crookes Laboratories' film on the discovery of colloids and their introduction into modern medicine is laid in Thomas Graham's laboratory in London in 1861. We are then shown the ultramicroscope, diagrams, chemical reactions, and the brownian movement of the colloidal particles, while a running commentary explains how colloids differ from other chemical states and how advantage can be taken of these differences in the preparation of drugs for use in the human body.

CONTRAST RADIOGRAPHY OF THE BREAST

AMPLE claims have been made for simple radiography of the breast, but it cannot always furnish those finer details which are necessary to diagnose the benign or the malignant character of a tumour in that situation. Therefore contrast radiography of the breast was developed by Oselladore in Italy and Hicken in America. Thorotrast was used at first, but several unfortunate results of its use led to the adoption of Uroselectan-B. Using Oselladore's technique of injecting the ducts through the nipple, Alexandre and Girardi[1] of Padua used uroselectan-B in breasts not diagnosed as malignant, but used thorotrast in breasts condemned to amputation, so as to compare the effects of the two contrasting media. Uroselectan-B was absorbed so quickly (no trace after half an hour) that the radiograms had to be made immediately after injection. From the results obtained in 17 cases the conclusion is drawn that this method is useful in differentiating between benign conditions, such as tumours, cysts, and abscesses, which push aside the ducts, and malignant growths, which interrupt the ducts by blocking them.

These observations refer only to the female breast; in the rudimentary male breast injection into the ducts is impracticable. To overcome this difficulty Alexandre[2] injected oxygen into the subcutaneous and the retromammary tissues, a method first tried with air by Grasso in 1934 and later successfully used by Hicken and others.[3] Alexandre's case was in a man who ten years after ablation of a tuberculous kidney had a hard lump in his left breast, the diagnosis lying between tuberculous adenitis, fibrolipoma, and epithelioma. Oxygen 350 c.cm. was injected instead of air because in Hicken's case the air was not entirely absorbed for six days. No trace of oxygen was found four hours after injection. From the radiogram the lump was labelled a fibrolipoma, and the diagnosis was confirmed at operation.

1. Alexandre, A. and Girardi, A. *Quad. Radiologia*, 1939, **4**, 250.

RURAL STORY

"Drive the Dead Leaves," by R. G. Nettell (Sampson Low, Marston and Co. Pp. 314. 7*s.* 6*d.*) is the story of Adam Clay, a farmer, his step-sister, Clare Golden, and Judith Lane, who has recently been discharged from a tuberculosis hospital. Adam meets Judith by chance in a train and takes her home with him to "Rookleas," his farm. They marry but decide to have no children. Though Clare is in love with Adam she soon learns to love Judith also and the ménage à trois runs smoothly enough, despite the ever-deepening depression of pre-war agriculture, until Judith's health breaks down again. She recovers only to be killed in an accident, leaving Adam free to marry Clare. This is a sad, quiet tale of the English countryside written with intense sympathy for the farming community. Mr. Nettell writes about the Cinderella of British industries with knowledge and justifiable bitterness. Especially moving is his account of an outbreak of foot-and-mouth disease necessitating the destruction of a herd of pedigree cattle. All whose tastes are essentially rural rather than urban will enjoy this novel written in the genuine Mary Webb tradition.

2. Alexandre, *Ibid*, p. 402.
3. Hicken, N. F., Best, R. R., Moon, C. F. and Harris, T. T. *J. Amer. med. Ass.* 1937, **108**, 864.

Births, Marriages and Deaths

BIRTHS

BEAUCHAMP.—In February, in China, the wife of Sir Ivor Beauchamp, M.R.C.S.—a son.

CORCORAN.—On May 3, at Lerwick, Shetland, the wife of Major T. M. Corcoran, R.A.M.C.—a son.

COYLE.—On April 27, at Blackheath, the wife of Dr. C. D. Coyle—a daughter.

ECKHOFF.—On May 1, at Tunbridge Wells, the wife of Mr. Nils Eckhoff, M.S.—a daughter.

ENRIGHT.—On April 28, at Hove, the wife of Dr. J. F. Enright—a daughter.

MCELWEE.—On May 1, at Calne, Wilts, the wife of Dr. F. C. McElwee—a son.

PAYNE.—On May 5, at Windsor, the wife of Mr. R. Vaughan Payne, F.R.C.S.—a daughter.

PURSER.—On May 6, in Westminster Hospital, the wife of Dr. J. A. Purser—a daughter.

WHITE.—On May 6, at Middle Furlong, Seaford, the wife of Mr. Norman White, F.R.C.S.—a son.

MARRIAGES

ENGLAND—SINGER.—On April 27, at Hastings, Stephen Thirlwall England to Olive May Singer, M.B., of Dulwich.

DEATHS

BULMER.—On April 25, at Providence, Rhode Island, George Alder Blumer, L.R.C.P.E., superintendent emeritus of Butler Hospital, Providence, aged 82.

DEVINE.—On May 1, in Portsmouth, Henry Devine, O.B.E., M.D. Lond. and Brist., F.R.C.P., aged 60.

LLOYD.—On April 30, at Llandilo, Carmarthenshire, Joseph Howell Lloyd, M.D. Lond.

RICHARDSON.—On May 1, in Edinburgh, George Younger Richardson, M.D. Edin., D.P.H.

STUART.—On May 3, in London, Frederick Stuart, M.B. Durh.